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New Company Succeeds Old International

Richard J. Cullen Announces Formation of New International Paper Co. To Supersede International Paper & Power Co.—Shares and Warrants Now Ready — Trading In New Company Shares.

Richard J. Cullen, president, announced on October 2 that the existence of the International Paper and Power Company will be terminated at the close of business October 4, 1941. This marks completion of the program approved by the stockholders at the special meeting held September 25, 1941, to substitute a single new company, the new International Paper Company, for both the International Paper and Power Company and the original International Paper Company. The new International Paper Company is the result of the consolidation, on September 30, of the original International Paper Company, which was incorporated in 1898, into a recently organized New York corporation. The consolidated corporation took the name "International Paper Company."

New Shares Now Ready

Shares and warrants of the new International Paper Company will be ready for distribution on October 6, 1941, against surrender of corresponding shares and warrants of International Paper and Power Company on the following basis: Upon surrender of each share of cumulative convertible 5% stock of International Paper and Power Company, there will be delivered one share of cumulative convertible 5% preferred stock of the new International Paper Company carrying the same accumulations of dividends as the share surrendered, which amounted to $5 at September 30, 1941.

For each share of common stock of International Paper and Power Company will be given one share of common stock of the new International Paper Company.

For each unit of common stock purchase warrants of International Paper and Power Company, there will be distributed a unit of common stock purchase warrants of the new International Paper Company.

The transfer books of the International Paper and Power Company will be closed as of the close of business Saturday, October 4, 1941, and will not be reopened.

On Monday, October 6, trading in the new International Paper Company common stock and cumulative convertible 5% preferred stock will start on the New York Stock Exchange and trading in the new International Paper Company common stock purchase warrants will start on the New York Curb Exchange. After the close of business Saturday, October 4, there will be no further trading in the International Paper and Power Company common and 5% preferred stocks and warrants on either Exchange.

Over 99% of the outstanding stock of the original International Paper Company was held by International Paper and Power Company and all of the shares so held were cancelled when the original International Paper Company was consolidated into the new corporation on September 30, 1941.

Only 6,796 shares of the original International Paper Company 7% preferred stock are still held by the public. These shares (with 209 shares held by a subsidiary) are being temporarily continued as outstanding stock of the new International Paper Company. A dividend of $63 a share has been declared thereon, payable October 15, 1941, to holders of record October 7, 1941, liquidating all back dividends. In addition, funds have been set aside to call these shares for redemption on January 15, 1942, at $115 a share, plus dividends for the additional quarter.

Outstanding Stock Converted in September

When the original International Paper Company was consolidated into the new company on September 30, 1941, the 27 shares of 6% preferred stock and 265 shares of common stock still held by the public were changed into stock of the new International Paper Company on the following basis: Each share of cumulative 6% preferred stock was changed into 1-1/5 shares of cumulative convertible 5% preferred stock and 2 shares of $15 par value common stock of the new International Paper Company. Each share of no par value common stock of the original International Paper Company was changed into 2 shares of $15 par value common stock of the new International Paper Company. The holders of the 6% preferred stock so converted will also receive in cash the equivalent of all dividends unpaid on their stock to September 30, 1941, amounting to $62.75 per share.

Government Issues New Paper Board Order

OPA Announces New Directive Order Covering Price Schedule 32 Including Paper Board Sold East of Rocky Mountains — New Schedule In Effect October 1 Explains Terms Trade Must Meet.

A new order on Part 1347, covering Paper and Paper Products, price schedule No. 32, affecting paperboard sold east of the Rocky Mountains, has just been released by the government. It states that: The Office of Price Administration, being charged with the maintenance of price stability and the prevention of undue price rises, has determined that the establishment of maximum prices for paperboard is essential in order to accomplish these purposes and is in the interest of national defense and national welfare, and that the maximum prices set forth herein are fair and reasonable. The determination of these prices comes after exhaustive investigations and numerous conferences with representatives of all branches of the paperboard trade.

Paperboard, and the boxes and containers manufactured therefrom, have become essential to the prosecution of the defense effort. The Office of Price Administration, through voluntary agreements and the establishment of price schedules for waste paper and other commodities, has been exerting its efforts to prevent undue price rises in those raw materials which go to make up paperboard. The price rises which are threatening in the paperboard industry are, therefore, unwarranted. Because of the countless uses for paperboard, the effect of an inflationary price would be to create a dangerous price spiral and, therefore, immediate action is necessary.

Accordingly, under the authority vested in me by Executive Order No. 8734, it is hereby directed that:

1347.51 Maximum Prices for Paperboard. On and after October 1, 1941, regardless of the terms of any contract of sale or purchase or other commitment, in the area east of the Rocky Mountains, no person shall sell, offer to sell, deliver or transfer any grade of paperboard, and no person shall buy, offer to buy, or accept delivery of any grade of paperboard at prices higher than the maximum prices set forth in appendices A and B hereof, incorporated herein as Sections 1347.61 and 1347.62, respectively.*

1347.52 Less than Maximum Prices. Lower prices than those set forth in Appendices A and B may, however, be charged, demanded, paid, or offered.*

1347.53 Evasion. The price limitations set forth in this schedule shall not be evaded by direct or indirect methods in connection with a purchase, sale, delivery, or transfer of paperboard, alone or in conjunction with any other material, or by way of any commission, service, transportation or other charge, or discount, premium or other privilege, or by tying-agreement or other trade understanding, or otherwise.*

1347.54 Records. Every person making purchases or sales aggregating ten tons or more of any or all grades of paperboard in any one month shall keep for inspection by the Office of Price Administration, for a period of not less than one year, complete and accurate records of each purchase or sale of paperboard made during such month and each month thereafter showing the date thereof, the name of the buyer or of the seller, the prices paid or received, the quantity and grade or grades so purchased or sold.*

1347.55 Reports. Every producer of any or all grades of paperboard shall, in addition to keeping records as required above, submit such reports as the Office of Price Administration may from time to time require.*

1347.56 Affirmation of Compliance. All persons who are required by Section 1347.54 to keep records, shall transmit, on or before November 10, 1941, and on or before the tenth day of each month thereafter, an affirmation of compliance on Form 132:1 containing a sworn statement that during the month for which the record is kept all purchases and sales were made at prices in compliance with this Schedule or with any exception or modification thereof. Copies of Form 132:1 can be procured from the Office of Price Administration or, provided no change is made in the style and content of it and that it is reproduced on 8″ by 10½″ paper, may be prepared by persons required to submit affirmation of compliance hereunder.*

1347.57 Enforcement. In the event or failure to abide by the price limitations, record or report requirements, or other provisions contained in this Schedule, the Office of Price Administration will make every effort to assure (a) that the Congress and the public are fully informed thereof, (b) that the powers of the Government, both State and Federal, are fully exerted in order to protect the public interest and the interests of those persons who comply with this Schedule, (c) that full advantage will be taken of the cooperation of the various political subdivisions of state, county, and local governments through calling to the attention of the proper authorities failures to comply with this Schedule which may be regarded as grounds for the revocation of licenses and permits; and (d) that the procurement services of the Government are requested to refrain from selling to or purchasing from those persons who fail to comply with this Schedule. Persons who have evidence of the offer, receipt, demand or payment of prices higher than the maximum prices, or of any evasion or effort to evade the provisions hereof, or of speculation or manipulation of prices of any or all of the grades of paperboard or of the hoarding or accumulation of unnecessary inventories thereof, are urged and requested to communicate with the Office of Price Administration.*

1347.58 Modification of the Price Schedule. Persons complaining of hardship or inequity in the operation of this Schedule may apply to the Office of Price Administration for approval of any modification thereof or exception therefrom. Such applications must include all relevant facts in detail and must be verified by the individual making the appli-

* Sections 1347.51 to 1347.62, inclusive, issued pursuant to the authority contained in Executive Order No. 8734.

cation or by an officer or partner of the business entity making the application.*

1347.59 DEFINITIONS. When used in this Schedule, or any modification or exceptions thereto, the term

(a) "Person" means an individual, partnership, association, corporation, or other business entity.

(b) "Paperboard" means all kinds, grades, types, calipers, colors, and patterns of paperboard.

(c) "Producer" means any person who manufactures from any raw material any type, grade or caliper of paperboard for any use whatsoever.

(d) "Gage list" means those lists set forth in United States Department of Commerce Simplified Practice Recommendation R44-36 entitled "Box Board Thicknesses."*

1347.60 EFFECTIVE DATE. This Schedule shall become effective on October 1, 1941.*

1347.61 APPENDIX A — Maximum Prices for Paperboard Used in the Manufacture of Folding Paper Boxes and Set-up Cartons.

(a)

Set-up Boxboards (No. 1 Gage List—Reg. 50's to 90's, incl. See Section (d) for other thicknesses [1])

	Maximum Base Price Per Ton (2000 lbs.)	Maximum Differentials Applying to the Maximum Base Price [2] 1-3 Tons	Over 3 Less 10	10 Tons or Over
Plain Chip	$45.00	+[3]5.00	+ 2.50	+ Base
News Vat Lined Chip	45.00	+ 6.50	+ 4.00	+ 1.50
Filled News	45.00	+ 8.00	+ 5.50	+ 3.00
Solid News [1]	45.00	+10.00	+ 7.50	+ 5.00
White Vat Lined	45.00	+20.00	+17.50	+15.00
Mounting Board	45.00	+ 8.00	+ 5.50	+ 3.00
Tube & Can Stock	45.00	+ 7.50	+ 5.00	+ 2.50

(b)

Folding Boards (No. 2 Gage List—Reg. 50's and 90's, incl. See Section (d) for other thicknesses)

	Maximum Base Price Per Ton (2000 lbs.)	Maximum Differentials Applying to the Maximum Base Price [2] 1-3 Tons	Over 3 Less 10	10 Tons or Over
Single Manila Lined, Jute-Mist Gray, Tan, Green Lined & Suit Box	$60.00	+[3]5.00	+ 2.50	+ Base
Bleached Manila Lined	60.00	+ 7.50	+ 5.00	+ 2.50
Semi-bending & Creasing Chip	60.00	— 7.50	—10.00	—12.50
Full Bending Chip	60.00	— 5.00	— 7.50	—10.00

(c)

White Patent Coated News [4] (No. 6 Gage List)

	Maximum Base Price Per Ton (2000 lbs.)	Maximum Differentials Applying to the Maximum Base Price [2] 1-3 Tons	Over 3 Less 10	10 Tons or Over
#1 Single White .020 and heavier	$75.00	+[3]5.00	+ 2.50	+ Base
#1 Single White .018	75.00	+ 7.50	+ 5.00	+ 2.50
#1 Single White .016	75.00	+10.00	+ 7.50	+ 5.00
#1 Single White 0.15	75.00	+12.50	+10.00	+ 7.50
#1 Single White .014	75.00	+15.00	+12.50	+10.00
#1 Double White .020 and heavier	75.00	+27.50	+25.00	+22.50
#1 Double White .018	75.00	+32.50	+30.00	+27.50
#1 Double White. 016	75.00	+37.50	+35.00	+32.50
#1 Double White .015	75.00	+40.00	+37.50	+35.00
#1 Double White .014	75.00	+42.50	+40.00	+37.50

[1] Except No. 3 Gage List.

[2] Exception to Quantity Differentials—Where a single buyer places a single or multiple order for paperboard of a single grade, thickness, type, and color, and where the sizes ordered and quantities demanded are such as to fill the trim of the seller's paper making machine and where the only cutting involved can be done by the slitter and chopper knives as the paperboard leaves the machine, the combined weight of such orders made simultaneously shall be used as the basis for the application of the quantity differential set forth herein.

[3] A "+" sign before a figure establishes it as the maximum amount that may be added to the base price in the sale or purchase of the kind and grade of paperboard in whose column the figure appears. Smaller amounts may be added. A "—" sign before a figure establishes it as the minimum amount that must be subtracted from the base price in the sale or purchase of the kind and grade of paperboard in whose column the figure appears. Larger amounts may be subtracted.

[4] Additional differentials applying to White Patent Coated News only:

Manila Back Non-Bender	+$10.00
Manila Back Bender	+$15.00

(d)

Additional Differentials Applying to All Grades

Regular 35's to 39's	+[3]5.00
Regular 40's to 49's	+ 5.00
Regular 91's to 100's	+ 2.50
Regular 101's to 120's	+ 5.00
Silicating (Per Side)	+ 2.50
Pasting 35's to 15's	+ 7.50
Pasting 14's to ½" Thick	+12.50
Trimming (Per Side)	+ 1.00
Gloss Iink	+ 2.50

(e)

All of the above maximum prices are for the respective grades and tonnages delivered to the consumer. Billing may be f.o.b. point of shipment with freight allowed to point of destination.

1347.62 APPENDIX B — Maximum Prices for Paperboard Used in the Manufacture of Corregated and Solid Fibre Boxes.

(a)

	Container Liners	Price Per M Sq. Ft.
.016	42 lb. Fourdrinier Kraft	$1.26
.016	47 lb. Fourdrinier Kraft	1.41
.016	49 lb. Fourdrinier Kraft	1.47
.016	50 lb. Fourdrinier Kraft	1.50
.016	52 lb. Fourdrinier Kraft	1.56
.016	52 lb.—150 lb. Test Cylinder Kraft	1.69
.016	56—58 lb.—100 lb. Test Natural Cylinder Kraft	1.82
.016	56—58 lb.—100 lb. Test Filled Cylinder Kraft	1.82
.016	52 lb.—100 lb. Test Yellow Fourdrinier Kraft	1.76
.016	56 lb.—125 lb. Test Yellow Cylinder Kraft	1.89
.016	56 lb. Chipboard	1.26
.016	64 lb. Jute	1.92

(b)

Liners Heavier than .016

.030	100 lb. Jute	3.00
.030	110 lb. Jute	3.30
.030	96 lb. Cylinder Kraft	3.12
.030	96 lb. Yellow Cylinder Kraft	3.24
.030	90 lb. Fourdrinier Kraft	2.70
.030	104 lb.—250 lb. Test Cylinder Kraft	3.38
.035	110 lb. High Test Cylinder Kraft	3.85

(c)

	Liners Lighter than .016	Price Per M Sq. Ft.
.012	33 lb. Kraft	.99
.012	38 lb. Kraft	1.14
.012	48 lb.—50 lb. Jute	1.50
.010	30 lb.—32 lb. Kraft	1.04

(d)

Corrugating Grades

.009	32 lb. Strawboard	.96
.009	26 lb. Fourdrinier Kraft	.78
.009	26 lb. Chestnut	.78
.009	26 lb. Pinewood	.78
.009	26 lb. Chip	.62
.009	25—30 lb. "Bogus" Corrugating Material	.90
.009	26 lb. Canadian (Sulphite & Ground Wood)	.78

(e)

All Kraft, Jute, and Chip prices are based on their respective natural colors except where specific provision is made otherwise in the above schedule.

(f)

For grades of Chipboard not found in this Appendix, a price per thousand square feet not in excess of $45.00 per ton may be charged. For grades of all other types of paperboard not found in this Appendix, a price per thousand square feet not in excess of $60.00 per ton may be charged. In the event that special circumstances are present, application should be made to the Office of Price Administration for a modification or exception to the Schedule in accordance with Section 1347.58 hereof.

(g)

All of the above maximum prices are for the respective grades and tonnages delivered to the consumer. Billing may be f.o.b. point of shipment with freight allowed to point of destination.

Williams Co. to Start Brookville Mill

The Williams Felt and Paper Company will operate the paper mill at Brookville, Ind. Negotiations for the sale of the former Hinde & Dauch Mill were conducted by Mansel L. Rankin of Sandusky, Ohio, paper and pulp mill broker.

A force of about forty-five men are now employed improving the mill and installing additional machinery, which has already been delivered for early production.

Brookville citizens are enthusiastic over the mill starting up, as it was the town's leading industry, and will again employ many of its local men.

Canadian Industry Reports Record Output

Report Just Issued By Department of Trade and Commerce Puts Gross Value of Paper and Pulp Products At $298,034,843 — This Is 22.2 Per Cent Higher Than Former Record Established In 1929.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., October 6, 1941—The official report of the Department of Trade and Commerce on the pulp and paper industry in Canada in 1940, just issued, states that the industry established many new records last year. The gross value of the products ($298,034,843) exceeded that of any previous year. as did also the net value ($158,230,575). Also exceeding that of any previous year were the cost of materials and supplies used ($108,758,862), the number of persons employed (34,719), the total salaries and wages paid ($56,073,812), and the cost of fuel used ($13,700,105).

Gross Value of Products 22% Over 1929

The extent of these increases is best measured by comparing them with the figures of the previous record year—the boom year of 1929. The gross value of the products showed an increase of 22.2% over the 1929 figures, the net value an increase of 29.9%, the cost of materials used an increase of 11.2%, the salaries and wages paid an increase of 11.7%, and the cost of fuel an increase of 4.1%. Power employed also reached a new high of 1,986,667 h.p. in 1940, an increase of 28.8% over 1929, replacing a large number of wage earners. On the other hand, the capital employed in the industry in 1940 ($642,979,942) was somewhat lower than in the years 1928, 1929 and 1930.

It is noted that the manufacture of pulp and paper has been consistently one of the most important industries in Canada during the past 25 years. Whether or not it retained in 1940 the rank it held in 1939 as first of all industries in respect to wage and salary distribution the compilers cannot say as complete statistics for other industries are not yet available, but it is pointed out that the net production for 1940 increased 53.4% over 1939 and was 178.1% over the low level depression in 1933.

Pulp and Paper Production Gains

There were 76 mills manufacturing pulp and 76 manufacturing paper. The pulp produced totalled 5,290,762 tons, valued at $149,005,267, and the paper produced totalled 4,319,414 tons, valued at $225,836,809. Of the paper manufactured 81.1% was news print, the quantity being 3,503,801 tons with a value of $158,447,311, as compared with 2,926,597 tons, valued at $120,858,583 in 1939. The 1940 production was over three times that of the United States in the same year, and formed 71.5% of the total North American production of 4,784,826 tons. This year so far there has been a rather smaller production, the output for the first six months of 1941 being estimated at 1,621,134 tons, a decrease of 20,853 tons, or 1.3% less than during the same period in 1940.

Increases were also shown in 1940 in the production of all other kinds of paper. That of book, writing and other fine papers rose 13.9% in quantity and 21.5% in value; the tonnage of wrapping paper rose 27.1% with an increase of 34.9% in value; boards increased 20.8% in quantity and 45.5% in value; tissue paper showed gains of 14.6% in volume and 21.2% in value; miscellaneous paper increased in quantity 28.1% and in value 30.5%.

Paper Exports Valued at $170,879,526

The paper and paper goods exported during the year were valued at $170,879,526, as compared with $124,127,104 in 1939. Of this newsprint was the chief export, with a value of $151,360,196. From the point of view of sustaining Canada's balance of trade, the products of wood and paper exported amounted to $234,254,085, thus being made up of the sum of the differences between exports and imports.

Of the paper products exported the larger increase other than newsprint was in paperboard; the exports of which were valued at $6,278,026, as compared with $2,717,387 in 1939.

Swedish Pulp and Paper Industry

A report received here from Stockholm tells of the disastrous effect of the war on Sweden's most important industry, its forest products industry. "Through the establishment of the Skagerack blockade in April, 1940," it says, "the Swedish forest products industry was cut off from both the important British market and also from overseas sales areas. But not only that, most European countries, such as France, Spain, and other markets are now out of reach for Swedish exports. The relatively confined possibilities that existed of transmitting goods via Italy to certain countries on the Mediterranean were closed with the entry of that country into the war." Britain and the United States were Sweden's most important markets for bleached sulphite cellulose, unbleached and bleached sulphate pulp, mechanical pulp, newsprint and wrapping paper. There have been increased sales to "still available" markets, but the review adds:

"Even though certain new trade agreements have had an importance that should not be undervalued, they can onlv make up to a minor extent for the effects of the Skagerack blockade."

Packaging of Cigarettes

Following the announcement of the Steel Controller that sheet steel for the manufacture of cigarette containers is not now available, the announcement is made that after the present stock on hand has been used up which will probably be by the end of the year, cardboard containers will be used exclusively in packaging cigarettes.

Coal Replaces Fuel Oil

Owing to the present and prospective shortage in fuel oil, due to the demand of tankers for carrying oil to Britain, the Canadian International Paper Company is replacing the fuel plant at its Three Rivers mill, at an outlay of some $364,500. This expenditure covers installation of units and pulverizers in the steam plant together with necessary coal handling equipment to permit the use of pulverized coal for fuel, replacing fuel oil. This work is expected to be completed early next year.

Chicago Market Reported Better Stabilized

Recent Meeting of National Paper Trade Association and Government Representative's Assurances Has Helped To Clarify Paper Supply Situation—Waste Paper Prices Now At Maximum Levels.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., October 6, 1941—Dealers report that there is an improved sentiment in the Chicago market following the meetings of the National Paper Trade Association and the presentation of the Government's angle by Norbert A. McKenna. "At least we know where we stand", said one prominent Chicago paper executive, "and we know that if we act cooperatively and with effect we are going to be able to dodge complete control of our entire procedure". The markets, of course, continue to be characterised by efforts to fill orders. Demand increased materially, not only from Defense sources but through an unprecedented retail demand arising as buyers tried to stock up before the excise taxes went into effect. All grades of paper are universally strong and the practice of handling business by the allotment method has grown every day.

Waste Paper Prices Set

Along with the news that waste paper has been put under license by the Office of Export Control, comes new revisions of the waste paper market here. As far as the licensing of waste paper is concerned, the Export Control office is reported to have placed under license waste paper in all forms, conversions and derivatives. Department of Commerce code numbers to be placed upon export declarations and export license applications have been listed with the types of waste paper covered by the schedule. Locally, Chicago's dealers buying prices are now at the ceiling levels established by the Office of Price Administration. Mixed paper is quoted at .25 to .30; No. 1 mixed clean, .30 to .35; No. 1 Book .90 to $1.00; folded news, .40 to .45; box board, .30 to .35; No. 2 book, .35 to .40; old containers, .45 to .50; white news blanks, $1.10 to $1.15 and No. 1 White shavings, $1.50 to $1.60. Prices paid by mills, f.o.b. Chicago per ton are No. 1 mixed, $13.00; Box board, $13.00; news, $15.00; old containers, $16.50; white news blanks, $32.00; No. 1 white shavings, $43.00; No. 1 book stock $31.50 and Overissue news, $17.00.

NSA Holds Chicago Session

The National Stationers Association will hold its thirty-sixth annual convention at the Palmer House, Chicago, next week. The dates for this annual program are October 6, 7, 8 and 9. The sessions are planned to iron out many of the problems confronting the stationery industry which arise from the shortages which have been plaguing the paper and paper supply industry. In fact, the Association has gone even further and arranged a Round Table Discussion on "After Defense Subsidies" with members of the University of Chicago's famous "Round Table" participating. The Association will also hold its usual attractive exhibition on the Exhibition Floor of the Palmer House with a number of names well known to the paper industry scheduled to display their wares to the large attendance expected. Included in the group will be the Bankers Box Company, Eaton Paper Corporation, National Blank Book Company, Quality Park Envelope Company, Underwood Elliott Fisher Company, Wilson-Jones Company; A. B. Dick Company, Boorum & Pease, Reyburn Manufacturing Company and others.

Paper Executives Get New Honors

Corwine Roach, head of the Capital City Paper Company of Springfield, Illinois, and B. E. Hopper of the Hopper Paper Company of Taylorville, Illinois, were re-elected directors of the Illinois Chamber of Commerce at the annual meeting of that organization held in Chicago this week. Mr. Roach, also chairman of the State Chamber's important Legislative Committee, was also a member of a group of experts who provided the answers to a series of questions on priorities, taxes and other problems in an "Information Please" program of unusual interest. L. E. Leverone, president of the Stein-Hall Company, makers of starches and dextroses, was elected president of the State Chamber at a meeting of the Board held on the final day.

Michigan Superintendents to Meet

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., October 2, 1941—At the October meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents Association to be held at the Park American Hotel on Thursday the 16th at 6:30 P.M., the following national officers have indicated their intention of being present: Grover Keeth of Rothschild, Wisconsin, Ray L. Barton, of Plainwell, Mich., George W. Cragie, Cumberland Mills, Maine, and "Bob" Eminger of Miamisburg, Ohio.

Past presidents of the association who plan to be present are Fred C. Boyce, Milwaukee, Wis. "Daddy" of the association, E. T. A. Coughlin of the Bryant Paper Company, and Roy H. Kelly, of the Marathon Paper Mills, Rothschild, Wis. Life memberships will be presented to two of the senior members, Lew Breyfogle, Kalamazoo, with Draper Brothers Felt Company, and Barney Benson of Elkart, Ind., with the Williams-Gray Company.

A feature of the program will be the presentation of diplomas to the charter members of The Chinese Paper Makers organization by "Confucius" Fred Boyce. The toastmaster will be Chauncey B. Smith, better known as "Baldy", who is affiliated with the Huron Milling Company.

Asks Compensation from Southern Kraft

Testimony was taken last week by the Wisconsin Industrial Commission at Marinette, Wis. on a workmen's compensation case of Susan Smith vs. Southern Kraft Corporation. Mrs. Smith alleges she contracted tuberculosis because of the nature of her employment, and asks compensation accordingly.

Expect Higher Earnings By Wisconsin Mills

Profits For September Quarter Expected To Exceed High Level of Last Year — Marinette Paper Co. Announces Wage Increase — Plan To Enlarge Flambeau River Forest — Other Mill News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., October 6, 1941—With backlogs swelling to the point where deliveries are months behind, Wisconsin mills are expected to announce substantial earnings statements for the quarter ending September 30. Profits are expected to exceed the high levels reached in 1940, the best record in twenty years. However, the net remaining for the stockholders is expected to be reduced materially by the heavy reserves needed for the new excess profits taxes.

Demands are rated currently in excess of production, because of accelerated domestic demands, government orders, and shipments to Britain and South America. Practically every mill is operating at capacity, and some expansion is taking place to step up production further. Pulp mills are having their best demand in years in trying to make up for the shortage of Scandinavian imports.

Marinette Raises Wages

One of the first announcements of the newly organized Marinette Paper Company, Marinette, Wis., was to the effect that a wage increase of three cents per hour would be granted to all hourly paid employees, effective last week. The company is a wholly owned subsidiary of the Scott Paper Company, which purchased the Southern Kraft division of the International Paper Company at Marinette and a pulp mill at Menominee, Mich.

Lewis H. Reed Made Manager

Lewis H. Reed has been appointed general manager, succeeding A. G. Stone, who is retiring. Mr. Stone was tendered a stag party last week by the administrative and office personnel and was presented with a silver cocktail set.

Mr. Stone came to Marinette in 1919 and remained there until 1927. In 1935 he returned to take over the management and had been spending most of his time in recent years at International's offices in York Haven, Pa., coming to Marinette frequently. He was recently made a life member of the Marinette Rotary club in appreciation of his civic-minded attitude and his general interest in the city's industrial development.

Plan to Enlarge Flambeau Forest

Enlargement of the Flambeau River State Forest within the next year or two is contemplated by the Wisconsin Conservation Commission. It is one of the few areas in Wisconsin which has a stand of virgin timber, and is located adjacent to the mills of the Flambeau Paper Company, Park Falls, Wis.

Purchase of 50 acres of timber in Sawyer County was approved last week. The commission has an option on a 1,500-acre tract owned by the C. L. Cecil Lumber Company of Duluth, Minn., and is negotiating for tracts held by the Heinz Lumber Company. Last year the holdings were greatly enlarged by the purchase of 19,000 acres on the north and south forks of the Flambeau River from the Tomahawk Kraft Paper Company, Tomahawk, Wis. The state now owns approximately 26,500 acres along the river, and plans to take over tracts of county-owned lands.

Guy C. Howard Discusses Plastics

Phenomenal growth of the plastics industry was described by Guy C. Howard of the Marathon Paper Mills Company, Rothschild, Wis., in an address last week before the Rotary club of Wausau, Wis. More than 600 plastic molding plants are in operation today, he said, enjoying a vast business because these products can be easily and economically molded or formed into complicated shapes with finished surfaces and dimensions. They possess many physical, chemical and electrical properties with outstanding advantages for a variety of purposes. Coal tar resin production reached 223,000,000 pounds in 1940, Mr. Howard said, and non-coal tar resin output was 54,000,000 pounds.

Dr. Brot Visits Paper Institute

Dr. Maurice V. Brot, who was assistant director of the technical paper school of Grenoble University in France while teaching there for the last twenty years, is spending several months at the Institute of Paper Chemistry, Appleton, Wis., working on experiments for an eastern corporation. He expects to return to New York in two or three months to reside there.

Dr. Brot, 61 years old, was retired on a pension last November, but found his income too scant for the high war prices in France. Because of his age, he and his wife were able to leave the country for the United States, with the help of American companies for whom he had previously worked. His exit was a difficult one, however, requiring the hurdling of much red tape and investigation by authorities. He finally managed passage on a Pan-American clipper, reaching New York last April. He was able to take with him about $1,000, and the difficulty of obtaining further withdrawals from France prompted him to begin life again as a "working man."

Nelson-Butzke Nuptials

Charles C. Nelson, engineer of the John Strange Paper Company, Menasha, Wis., and Miss Gladys F. Butzke of Milwaukee, Wis., were married October 1 at Milwaukee. They are on a honeymoon trip to New Orleans, and will reside at 109 Center street, Neenah, Wis.

Puget Sound Wins Judgment

Judgment was rendered today in favor of Puget Sound Pulp and Timber Company, defendant, in an action brought by the Pioneer Oyster Company, seeking to enjoin the pulp company from discharging sulphite waste liquors in Puget Sound.

The suit, regarded as a test case, was tried before Judge John C. Bowen in the U. S. District Court, Seattle. Counsel for defendant is of the opinion that the decision will not be appealed.

Drought and Pulp Scarcity Affect Output

Some Pennsylvania Mills Reported Handicapped By Lack of Sulphite Pulp and Low Water Supply—Atlantic Gummed Paper Corp. Explains Supply Situation In Price List Sent To Its Customers.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., October 6, 1941—With the Jewish holiday, the scarcity of sulphite pulp and the continued drought, which has been prevailing in this area for the past two months, business in the paper industry shows little or no improvement, and it might well be said that these are contributory and salient forces in putting a damper on expectations of resumption of sizable demand.

Drought Handicaps Some Mills

Due to the drought, the situation for the paper mills is very definitely aggravated, and those in the know state that a very prominent mill within a radius of one hundred miles of Philadelphia which has been closed down for three or four weeks, may decide to discontinue operations permanently if the drought continues. On the other hand, the worst stringency in some quarters is the lack of sulphite pulp, and because of this, one of the best known manufacturers hereabouts has had to depend entirely on the use of soda pulp.

A marked proportion of those in the trade here state that while cognizant of the problems of the government under the stress of the growing national emergency, they believe that they should have received more advance warning concerning the extent and nature of raw material shortages.

Explains Backlog Orders Situation

Frederick I. Brower, mill representative of the Atlantic Gummed Paper Corporation, Drexel Building, sent out to all their customers a prevailing price-list on September 19, accompanied by a letter reading: "The price-list herewith does not constitute an offer to accept sealing tape tonnage, nor does it represent firm prices. Instead, it simply indicates the probable value of a jobber's stock. New commitments will only be entered on the basis of our letter of September 3, which is as follows: Subject to mill's acceptance and at 'price prevailing at time of shipment'—monthly quota based on one-twelfth of 1940 consumption and the quota subject to our ability to secure raw materials. Unfilled portions of quotas are considered 'cancelled' if we cannot ship within the 30-day period, therefore, the balance may not carry over to accumulate on the following month's quota.

Preference Given to Urgent Need Orders

"In an effort to keep all customers supplied, we have given preference where the need was most urgent, regardless of whether the order carried a firm price or was entered at 'price prevailing.' By so doing, a huge backlog of orders at definite prices has accumulated and these are below today's costs.

"Under the circumstances, we are compelled to clean up the backlog of orders at 'definite prices' before making shipment of any commitment entered at 'price prevailing.' This may take four to five weeks; it will depend upon receipts of kraft paper. While we regret the necessity of having to take this action, exceptions cannot be made—we are striving to accomplish the greatest good for the greatest number of regular customers only."

Shortage in Some Lines Expected

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., October 6, 1941—While business continued good in the local paper market last week, a note of concern was struck by manufacturers and jobbers to the effect that there may be a positive shortage of some lines by the first of the year or perhaps before. Some local jobbers declared they are expecting a shortage in some of the fine papers, particularly for accounting records and business correspondence and paper used for magazines, books and other periodicals. Quite a few large publishing houses are in this section and they likely will be inconvenienced. It is possible that some of the publishers will be weaned away, temporarily, from high grade to cheaper papers. Some are predicting a shortage in bags and wrapping papers and in several grades of container materials. There is little the local trade can do about it. Demand has been heavy for some time and warehouse stocks are none too large.

Last week demand for fine paper continued heavy with prices firm to strong. There is nothing that would indicate a recession in demand at the present time.

Building papers and roofing continued good and predictions now are that new construction in this section this year will set an all-time high. Dealers are finding it increasingly difficult to secure shipments, but thus far have been able to fill practically all orders. Prices are strong.

Increasing activities of defense industries has caused a further increase in the box demand. Local box makers are working virtually to capacity and are unable to keep pace with the orders. Demand for containers for the ice cream trade his dwindled some during the last week with the coming of cooler weather, but this was expected.

Tissues were steady last week and demand for bags and wrapping paper continued strong.

The rag market last week was reported strong with prices showing fractional increases in some of the better grades. Collection of waste paper went on unabated with prices steady in view of trade agreements.

Capco Papers in New Home

Capco Papers, Inc., general paper merchants, 1541 Hansford street, Charleston, W. Va., plan to observe its third anniversary soon. The concern recently moved into its new warehouse and office building at the above address. It is affiliated with the Central Paper Company, Columbus, Ohio., which was established in 1872 by O. A. Miller, who is now chairman of the board of directors.

Opposes Higher Pulp Prices

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Oct. 8, 1941—Advances of from $4.00 to $11.50 a ton in wood pulp contract prices quoted by several leading producers for fourth quarter delivery may compel the Office of Price Administration to impose a schedule of ceiling prices at or below third quarter levels, Leon Henderson, Administrator, announced today.

Mr. Henderson disclosed that an industry-wide investigation of all factors relating to pulp producing costs is being conducted by the Federal Tariff Commission at the request of OPA. This study, which began around August 15th, should be completed within a few weeks.

"Obviously," the Administrator said, "I should prefer to wait for the Tariff Commission's findings before deciding whether action is necessary. However, there is ample evidence already at hand to show that the prices at which wood pulp has sold over the past 12 months have been more than adequate to most producers. To allow still higher prices when every effort must be made to resist inflation seems out of the question."

There are several major types of wood pulp—mechanically ground, sulphite (bleached and unbleached), sulphate (bleached and unbleached), and soda pulp. About 95% of all wood pulp consumed in the United States is used by the paper industry. Integrated paper companies are self-sufficient in respect to pulp supplies and many sell pulp under contract and in the open market to other paper mills. There are about 10 major companies which produce pulp exclusively for sale.

Container Corporation of America, Chicago; Eastern Corporation, Bangor, Me.; St. Regis Kraft Company, Tacoma, Wash. (a subsidiary of St. Regis Paper Company, New York); and West Virginia Pulp and Paper Company, New York, were named by Mr. Henderson as examples of four large integrated companies that have raised contract pulp prices. None of the companies making pulp exclusively for sale has announced higher prices so far as is known.

According to Mr. Henderson, Container Corporation has raised the price of its Conus brand pulp from $60 to $70 a ton; Eastern Corporation has increased Orono pulp from $63.50 to $75 a ton and West Virginia Pulp and Paper is asking $70 a ton for soda pulp, an advance of $4 a ton. St. Regis Kraft is quoting a price of $87.50 a ton for its Tacoma brand bleached Kraft, an increase of $5.00 a ton, for the month of October, stating that new prices for the remainder of the year will be determined later.

Representatives of these four concerns, as well as of other principal pulp companies, are being invited to attend a meeting in Washington on October 10.

Mr. Henderson recalled that verbal agreements between his office and a number of leading pulp makers had served to avert price increases last spring, when imports from Northern Europe were cut off. The understanding was that, in the absence of unusual circumstances, no advances would be made over the remainder of 1941.

"Until recently, this voluntary control worked very well and no attempts to raise prices were made even by companies which had not been represented in the discussions," Mr. Henderson said. "The four companies that have now disturbed an otherwise stable price structure gave no advance notice to the Office of Price Administration, nor have they afforded buyers of their pulp any satisfactory reasons why higher prices are necessary.

"If permitted to go unchallenged, these increases would become general throughout the pulp industry, higher paper prices would follow, and the country would be pushed a little further along the road to inflation."

Alliance Announces Appointments

The Alliance Paper Mills, Ltd., Meritton, Ont., Canada, announces the following appointments in its organization:

B. D. Millidge has been appointed vice-president and general manager, to succeed the late Geo. W. Pauline.

L. E. Fleck has been appointed vice-president and manager of the coating division.

John R. Leslie, formerly secretary-treasurer, has been appointed controller and treasurer.

P. F. J. Dolan, formerly assistant secretary, has been appointed secretary.

Harry Ramsay, western sales representative, has been appointed sales manager. As soon as he can be relieved of his duties in the West, he will locate at 350 Bay street, Toronto.

W. A. Woodruff, who has been in charge of the Toronto sales, has been appointed assistant to the sales manager.

Don Valley Makes Appointments

The Don Valley Paper Company, Ltd., Toronto, Ont., Canada, announces the following appointments:

B. D. Millidge has been appointed vice-president and general manager to succeed the late Geo. W. Pauline.

John R. Leslie, formerly secretary-treasurer, has been appointed controller and treasurer.

P. F. J. Dolan, formerly assistant secretary, has been appointed secretary.

C. A. Henderson and Miss DeBaufer Wed

Charles A. Henderson, son of Mr. and Mrs. C. L. Henderson, and Miss Jeanne DeBaufer, both of Appleton, Wis., were married September 12 at Butte des Morts Golf club at Appleton by the Rev. Dascomb E. Forbush, pastor of the First Congregational Church. Mr. Henderson is associated with the Kimberly-Clark Corporation at Neenah, Wis. He and his bride will reside in Chicago for about six weeks while Mr. Henderson finishes his work there, and thereafter will live in Appleton.

H. G. Johnson Goes to Indianapolis

Manning, Maxwell & Moore, Inc. of Bridgeport, Conn. announce the appointment of Harry G. Johnson as territorial salesman for Indianapolis. Mr. Johnson will cover the territory formerly handled by Gerald Beebe, who has been extended a leave of absence due to illness.

Mr. Johnson will handle the sales for the products of all four of the firm's Bridgeport divisions, covering Hancock Valves, Ashcroft Gauges, Consolidated Safety Valves, and American Industrial Instruments.

Recausticizing

FOR SULFATE AND SODA PULP

IF YOU ARE THINKING ABOUT

- **ENLARGING YOUR PRESENT PLANT**
- **BUILDING A NEW ONE**
- **SHIFTING FROM BATCH TO CONTINUOUS PROCESSING**

WE KNOW WE CAN HELP YOU

★ **The Dorr Continuous Recausticizing System has been practically the universal choice of all new chemical pulp mills built in the last 10 years.**

There has never been a single one that has failed to make good on the promises we made for it.

The operating headaches that beset all new systems in their early stages were worked out of the Dorr System years ago — long before we attained our present installed capacity of over 8500 tons of pulp per day.

The reason for this success is a simple rule of three — First, correct engineering analysis; Second, correct design and manufacture; Third, correct field inspection and supervision of the initial operation.

In short, we shoulder the full responsibility from the day the order is placed until the plant is turned over to you in full balanced operation.

This "rule of three" is the best rule we have. It is your best assurance against unpleasant surprises.

DORRCO

THE DORR COMPANY, INC., ENGINEERS

NEW YORK, N. Y. . . . 570 LEXINGTON AVE.
ATLANTA, GA. . . . CANDLER BUILDING
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CHICAGO, ILL. . . . . 221 NO. LA SALLE ST.
DENVER, COLO. . . . . COOPER BUILDING
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570 LEXINGTON AVE., NEW YORK

DORR

CONTINUOUS PROCESSING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

R. B. Wolf to Get TAPPI Medal

The gold medal of the Technical Association of the Pulp and Paper Industry will be presented to Robert B. Wolf. This medal is awarded by vote of the Executive Committee to an individual who has made outstanding contributions to the technical advancement of the pulp and paper industry.

Previous awards have been made to William H. Mason (1928), President of the Masonite Corporation Process; Ogden Minton (1928) President, Minton Vacuum Dryer Corporation; Ernest Mahler (1933) Vice President, Kimberly-Clark Corporation; Edwin Sutermeister (1935), Chief Chemist, S. D. Warren Company; William H. Millspaugh (1936),

ROBERT B. WOLF

President, Millspaugh, Ltd.; Clarence J. West (1937), Editor of Publications, Institute of Paper Chemistry; Carl B. Thorne (1938) Vice President, Canadian International Paper Company; J. Newell Stephenson (1939), Editor, Pulp and Paper Magazine of Canada; and Otto Kress (1940) Technical Director, Institute of Paper Chemistry.

Robert Bunsen Wolf, since 1931 manager of the Pulp Division of the Weyerhaeuser Timber Company, Longview, Wash., was born in Newark, Dela., received a B.E.E. degree from the University of Delaware and later an M.E. degree from that institution. After practical experience as workman in pulp and paper mills in New York State and New England, he held successively executive positions with the International Paper Company, the Union Bag and Paper Company, and the Burgess Sulphite Fibre Company. While with the latter, at Berlin, N. H., he developed the graphical methods for evaluating qualitative and quantitative manufacturing variables which greatly accelerated the science of pulp making. His previous practical application of the method of graphically recording steam, gauge, and gas pressures during the cooking operation were extended to include "progress" records and the use of nonfinancial incentives to release the creative power of the individual workman. In 1917, he became manager of the Spanish River Pulp and Paper Company's mills in Ontario, Canada. After serving as staff assistant to the director general of the U. S. Emergency Fleet Corporation during the first World War, he went into business in New York City, supplying the pulp and paper industry with improved equipment and processes. He has been granted patents on various aspects of pulp manufacture, notably in the field of high consistency bleaching and the use of strong cooking acid. He pioneered in functionalized accounting, and is the author of many technical articles on labor, management, and scientific subjects. He helped found TAPPI, and was once vice president. He is a Fellow of the American Society of Mechanical Engineers.

Canada Again Restricts Chlorine

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., Oct. 6, 1941—Further restriction in the use of chlorine in the manufacture of pulp and paper is embodied in an order, effective October 6, issued by J. D. Lorimer, chemicals controller.

Exemption is provided for the use of chlorine for bacteriological purposes and also for pulps with not less than 90% alpha cellulose content, dissolving pulps, and nitrating pulps.

Pulps from which chlorine is a processing rather than a bleaching chemical also are exempt, but application for exemption must be submitted in writing, together with supporting facts, to the chemical controller.

The new regulation provides the brightness of bleached sulphite and bleached sulphate shall not exceed 76; similarly, the brightness of soda pulp and waste paper when used for conversion into bleached paper shall not exceed 74.

For the purpose of bleaching rag stock, the order states further that no pulp or pulp manufacturing shall consume in any quarter starting October 1, 1941, a greater amount of chlorine per ton of rag stock treated than 80% of its consumption in the six months ended July 31, 1941. Further, for the purpose of making semi-bleached woodpulp, quarterly consumption of chlorine per ton of semi-bleached woodpulp made shall not exceed 70% of per ton consumption in the six months ended July 31, 1941.

The order prohibits any change in the proportion of bleached, semi-bleached and unbleached pulps in the making of any specific grades of paper "until adequate brightness standards for paper are established," or any increase in the brightness of any paper beyond that now in effect.

To prevent competitive advantage it is also ruled that "persons making their own chlorine supplies shall conduct their operations so that the resulting effect on the pulp and paper they make shall be similar to that obtaining in other mills under this order."

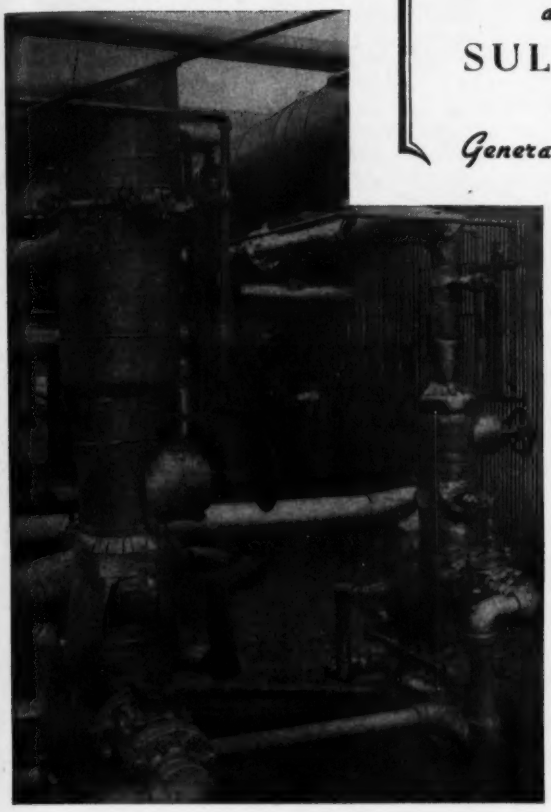
Walter Shorter Heads Container Branch

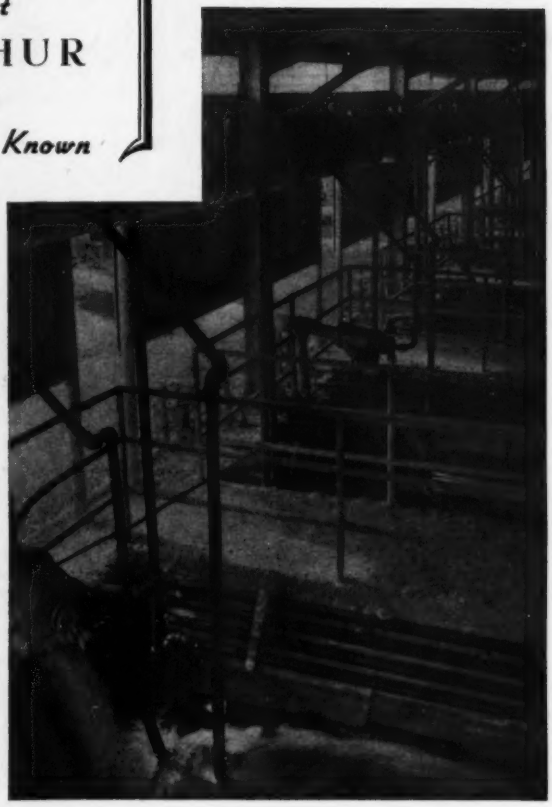
[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 8, 1941—OPM has announced the organization of the Division of Purchases into industrial branches.

Walter Shorter, assistant director of purchases, is in charge of the Container Branch. Sales manager of the specialties division of the International Paper Company, Mr. Shorter came to OPM last winter as assistant to the Director of Purchases, and later served for several months as purchasing consultant to the Pulp and Paper Section in the Production Division of OPM.

Interesting Facts about
SULPHUR
not Generally Known





Collecting Stations

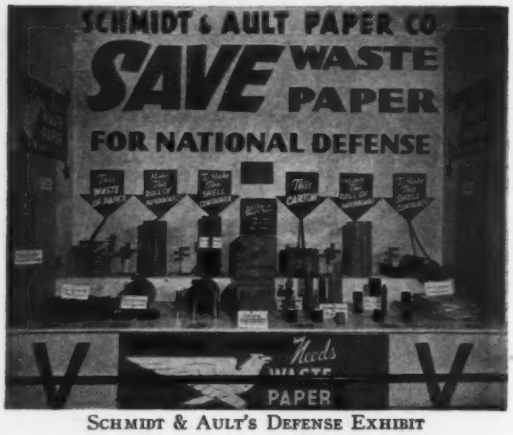
These stations are the collection points for the Sulphur as it is first produced from the underground deposit. Here are the regulating valves on the water, air, steam and Sulphur lines, conveniently grouped so as to make possible the adjustments necessary for the best operating conditions at each individual well. ★ The stations are located close to the area being mined — usually within a few hundred yards of the most distant tributary well. The production from each well is accurately measured while the Sulphur is still molten and is then collected in sumps dimensioned to suit the number of wells in that particular area. These sumps are lined with metal and equipped with steam coils to keep the Sulphur in the liquid state. ★ The liquid Sulphur is finally pumped to the storage vats—often a distance of several miles—to solidify and await shipment to industry.

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

10-TG-4

Paper Co. Makes Defense Exhibit

Because of the nation-wide attention and interest of products for defense, the York Inter-State Fair, which opened at York, Pa., on October 3, included many exhibits not of an agricultural nature, as in former years. The fair officials requested this year all manufacturers of York to display products going into defense. With the permission of various government departments, manufacturers of York County took over the whole exhibit building.



SCHMIDT & AULT'S DEFENSE EXHIBIT

In the accompanying photograph is shown the exhibit of the Schmidt & Ault Paper Company, which conveys to the public the importance of the contribution that paper products is making for defense and the need of national defense for waste paper.

More Emphasis on Allocations

WASHINGTON, D. C., Oct. 8, 1941—While forecasting an increased emphasis on allocations of basic defense materials to industry, Donald M. Nelson, Director of Priorities at OPM, nevertheless expects to continue the present priorities system as part of the general plan, he stated recently in clarification of present programs.

Appearing before the House Banking and Currency Committee, he explained a contemplated plan by which the agricultural implements industry will be made the subject of an experiment in combining a system of allocations and priorities, with greater stress on allocations.

"A manufacturer can't operate unless he knows how much material he is going to get and when he is going to get it," Mr. Nelson said to the committee. "He can't get this information from a mere preference rating because many other firms in the same business may have the same rating."

However, he added, in a subsequent explanation of the plan, "no sudden or abrupt" changes are in prospect even though more emphasis will be required on allocations by defense needs.

"There will be increased emphasis on allocations of materials and classifications of end uses," he said. "The priorities instruments now used will continue to be used as parts of the system. All existing regulations and orders and certificates must be scrupulously obeyed and violators will be held to account."

Start Expansion of Kennebec Plant

Work is in full progress on the foundation for a new paper mill at the Kennebec Pulp and Paper Company where $300,000 will be spent by June, 1942 to erect a plant for turning out a different grade of products from those already produced, says the *Journal* of Augusta, Me.

Anton M. Lund, general manager of the mill, said the new plant would employ from 100 to 150 men and women in addition to the 330 already employed, producing a slightly different grade of products to "fill out the line of merchandise."

The new structure will be a two-story building running east and west, and resting on the massive granite blocks which provided the foundation for the mill which was destroyed by fire in December, 1938. The steel-framed brick structure is to be constructed by James Leck Company of Minneapolis.

Mr. Lund said the work could now proceed, since the firm had made arrangements for a tax abatement from the city making it possible financially to carry out the project. The job will be carried out in spite of the fact that negotiations for the purchase of land, which have been under discussion for a long period of time, are now "at a standstill."

The new structure will be built over a huge excavation extending to the level of the river bank. The old foundations were found to be in excellent shape, needing only occasional reinforcement and finishing work. Some piling will be necessary, and a central foundation section is being built in the base of the excavation to support concrete piers to support the center portion of the building. The structure will be two stories high in the main portion and will extend over a roadway running through the mill yard and connect with a recently built storage building near the Maine Central Railroad tracks.

It will also be necessary to convert one small digester to a large unit in the sulphite mill to increase the capacity of the bleaching equipment.

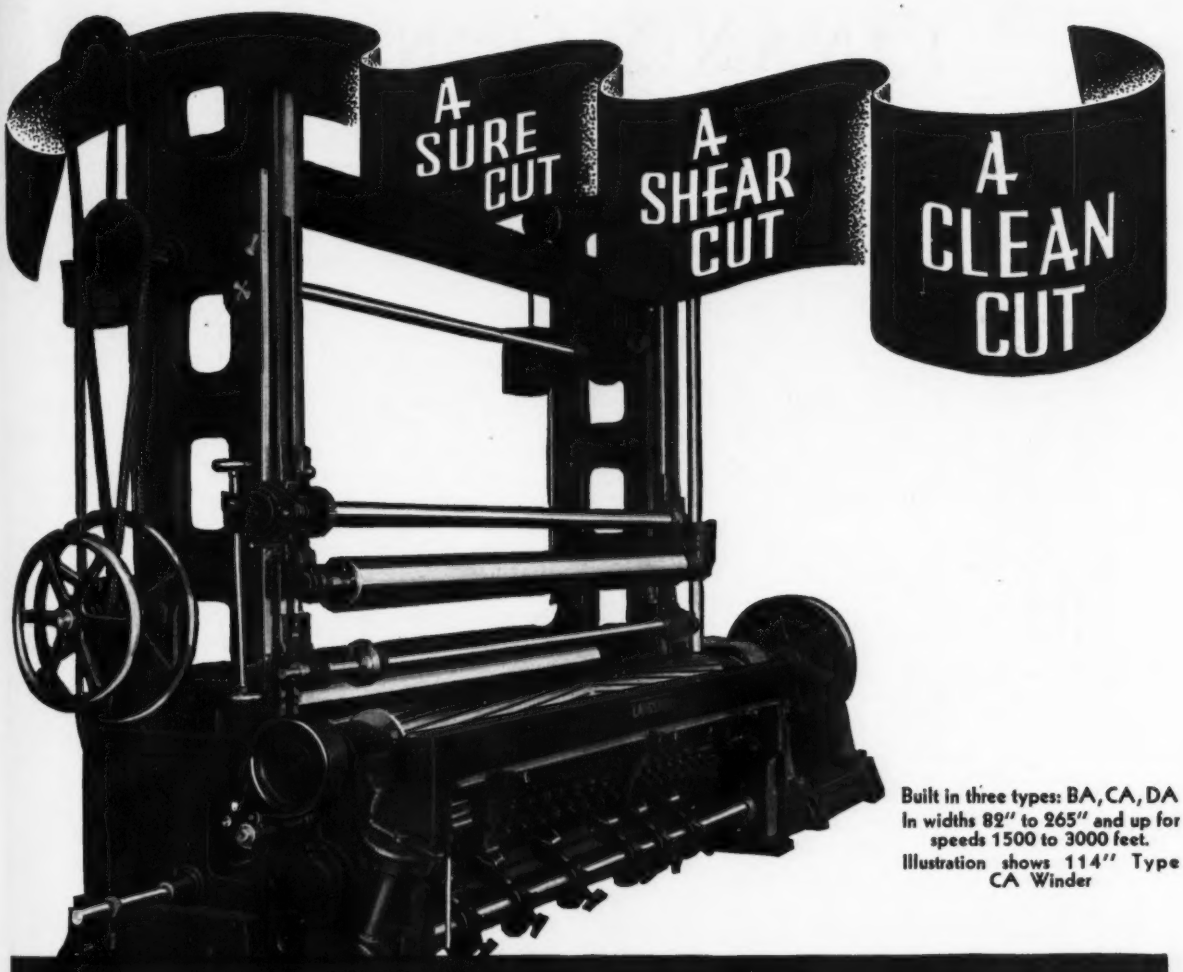
A converting room for preparing the finished products for marketing, will be part of the project. The plant manufactures toilet tissues, napkins, towels and specialty products.

The firm, which came to Augusta six years ago to take over the property of the old Cushnoc Paper Company, then in receivership, has enjoyed a growing business. When the old sulphite mill was destroyed by fire in 1938, the plant continued manufacture with sulphite purchased from other Maine mills. A new sulphite mill was then constructed, and it now not only supplies the Augusta mill, but turns out sulphite for a Pennsylvania mill also operated by the Hudson Pulp and Paper Corporation, which controls the Augusta mill.

The new sulphite mill was built along the most modern principles and draws visitors from many parts of the country who come to see the up-to-date plant in operation.

Brown Paper Stock Buys Building

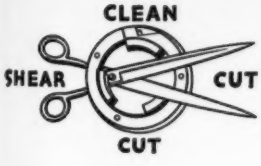
ST. LOUIS, Mo., October 6, 1941 — The Brown Paper Stock Company has purchased the two-story and basement building on the southeast corner of 17th and Austin streets. The lot measures 100 by 155 feet and the building, which covers it has a total area of 45.000 square feet, is sprinklered and is served by a Missouri-Pacific switch.



Built in three types: BA, CA, DA
In widths 82" to 265" and up for speeds 1500 to 3000 feet.
Illustration shows 114" Type CA Winder

LANGSTON

Slitters & Roll Winders



THIS IS ONE of five sizes and types designed to meet every requirement in the mill, finishing room or paper converting plant.

Langston's heavy construction and balancing of drums and idlers prevents vibration. Bearings, gears, and all parts are proportioned to assure maximum service. Learn more about the all-around efficiency of Langston Slitters and Roll Winders. We are at your service.

SAMUEL M. LANGSTON COMPANY, Camden, N. J.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending October 8, 1941

	High	Low	Last
A. P. W.	1⅝	1⅝	1⅝
Armstrong Cork Co.	29¼	28⅞	28⅞
Celotex Corp.	8⅞	8½	8½
Celotex Corp., pf.	74¼	72	72
Certain-Teed Products Corp.	3¼	3⅛	3⅛
Certain-Teed Products Corp., pf.	32	30½	30¾
Champion Paper & Fibre Co.	22¼	22	22
Champion Paper & Fibre Co., pf.	106½	104¾	106½
Congoleum-Nairn Co.	17¾	17¼	17¼
Container Corp. of America	15⅞	14½	14⅝
Continental Diamond Fibre Co.	9¾	9⅜	9⅜
Crown-Zellerbach Co.	13½	13¼	13¼
Crown-Zellerbach Co., pf.	94	91¼	92½
Flintkote Co.	13⅜	13⅛	13⅛
Robert Gair	2¼	2⅛	2⅛
Robert Gair, pf.	11	10¾	10¾
International Paper & Power	18⅜	17½	18
International Paper & Power, pf.	70½	69¾	69¾
Johns-Manville Corp.	69	64¼	64¼
Johns-Manville Corp., pf.	122½	122½	122½
Kimberly Clark Corp.	31¼	30	30
MacAndrews & Forbes	29½	28½	28½
MacAndrews & Forbes, pf.	137	136¼	137
Masonite Corp.	27⅛	25¾	26⅛
Mead Corp.	8⅛	8	8⅛
Mead Corp., pf.	78	78	78
Paraffine Companies, Inc.	30¼	30¼	30¼
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	14¾	13¾	13¾
Rayonier, Inc., pf.	28	27½	27½
Ruberoid Co.	19½	18½	19½
Scott Paper Co.	38½	38½	38½
Scott Paper Co., pf.	....	....	....
Sutherland Paper Co.	19⅞	19⅝	19⅞
Union Bag & Paper Corp.	11⅛	10¾	10¾
United Paperboard Co.	4¼	4¼	4¼
U. S. Gypsum Co.	59⅞	57⅜	57⅜
U. S. Gypsum Co., pf.	177½	176	176
West Virginia Pulp & Paper Co.	19⅝	18½	18½

New York Curb Exchange

High, Low and Last for Week Ending October 8, 1941

	High	Low	Last
American Box Board Co.	5	5	5
Brown Co., pf.	22¾	21	22
Great Northern Paper	38½	38½	38½
Hummel-Ross Fibre Corp.	5⅝	5¼	5¼
National Container Corp.	10¼	10⅛	10⅛
St. Regis Paper Co.	2	1⅞	2
St. Regis Paper Co., pf.	109	108¼	109
Taggart Corp.	3	2⅞	2⅞

M. & O. Prospects Improve

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Int., Oct. 6, 1941—The third quarter operations of Minnesota and Ontario Paper Company are expected to compare favorably with those of the second quarter, and it is anticipated that with the improvement which has taken place in the paper industry the fourth quarter will show further improvement. In the first quarter of the year operations of the company were affected by a power shortage at International Falls and Fort Frances, and after meeting all charges there was a small deficit for the period. In the second quarter these conditions were corrected, and net earnings, after all charges, were equal to 37 cents a share on the common stock. Net for the first six months of 36 cents a share, compared with 60 cents for similar period of 1940.

United Wall Paper Elects

Directors of United Wall Paper Factories, Inc., have elected William H. Yates executive vice-president. Mr. Yates, who is also secretary and treasurer, will act as executive head of the company in the absence of Albert J. Browning, president, who has been appointed assistant to Donald Nelson, director of priorities of the Office of Production Management.

Taggart To Redeem Bonds

R. K. Ferguson, president of the Taggart Corporation, announced on September 29 that the corporation will call for redemption on November 1, $317,500 Champion Paper Corporation 1st mortgage 6% sinking fund gold bonds due February 1, 1945, at 102% of face value and interest to November 1. The bonds will be redeemed at the office of the Northern New York Trust Company, Watertown.

The corporation does not require any new financing for the call of these bonds but will use surplus cash for this purpose.

Taggart Corporation paper mills and bag factories are operating at capacity and these operations at the present time give employment to 1,000 persons at its plants located in Watertown, Oswego, Carthage and Herrings.

Recently Mr. Ferguson announced a project for the building of a new bag factory with a capacity of 250,000 bags per day to be located adjacent to the paper mill of the Chesapeake-Camp Corporation at Franklin, Va. The corporation is expected to have this new factory in operation January 1, 1942.

Johns-Manville Elects Officials

Lewis H. Brown, president of the Johns-Manville Corporation, has announced the election of John A. O'Brien and Leslie A. Baldwin as vice presidents of the Johns-Manville Sales Corp.

Mr. O'Brien will continue as general sales manager of the power products and industrial department and Mr. Baldwin will manage sales of industrial products to the chemical and paint, automobile and nonferrous metals industries.

Mr. O'Brien began his career with the company in 1915 as a stenographer, and since has held various sales and executive positions with it. Mr. Baldwin went to the company as a salesman in 1920 and has risen through various sales and executive positions.

Columbia Box Board Gets Desist Order

WASHINGTON, D. C., October 8, 1941—The National Labor Relations Board has announced an order directing Columbia Box Board Mills, Inc., Chatham, N. Y., to cease and desist from interfering with self-organization of its employees.

The company was directed to post cease and desist notices throughout its plant for a period of two months and within 10 days of the Board's order notify the Regional Director in New York City of any compliance action.

Union Bag Votes Dividend

Directors of the Union Bag and Paper Corporation have declared a dividend of 25 cents a share on the capital stock, payable October 14 to stockholders of record October 9. This brings dividends declared so far this year to 75 cents a share compared with 55 cents for the comparable period last year.

Raw Material Supplies Delayed

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., September 29, 1941—Several of the largest concerns in this section are experiencing delay in securing raw materials which has resulted in a slight slowing down in operations, those industries not engaged in defense production being the hardest hit.

Production of paper machines at the Bagley & Sewall Company has been decreased from 15 to 20 per cent because of delays in shipments of materials and it was stated that orders are consequently being delayed. It was said that about 65 per cent of the entire plant operation is being concentrated on national defense. The vise department is operating 100 per cent on defense work, the orders being mainly for this country and Great Britain. An official of the concern said that there is considerable difficulty to obtain stainless steel without a priority, the product being used in making paper machines. Even with a priority rating the delivery of raw materials has been slow. The business at the plant is conceded to be the best in several years with about 450 workers being steadily employed.

Lack of materials at the Carthage Machine Company has brought increasing threats of a curtailment of production. The company's output of steel chippers, used by paper mills throughout this country and Canada has been decreased to some extent as a result and it is understood that requests for materials have not met with any great response.

The situation at the Coty Machine Company has not been unfavorable, the firm being fortunate in securing its materials for the making of paper bag machines. Customers of the concern are classified in the priority class and the rating is passed along to the machine firm. It was stated that some difficulty has been experienced in obtaining brass tubing and sheet brass although the situation was remedied by the use of substitutes.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 8, 1941—Government Printing Office has received the following bids for 200,000 sheets of white railroad board: Barton, Duer & Koch Paper Company, $35.27 per M sheets; Bradner Smith & Co., $35.62; Stanford Paper Company, $36.00; R. P. Andrews Paper Company, $35.89; and Paper Corporation of U. S., $39.40.

For 77,000 pounds of offset book paper: Mudge Paper Company, 9.4 cents; and Paper Corporation of U. S., 9.1 cents.

For 20,100 pounds of 75% rag, 24 x 38 laid antique book paper: R. P. Andrews Paper Company, 17.47 cents; Barton, Duer & Koch Paper Company, 17.45 cents; Paper Corporation of U. S., 14.8 cents; and Parsons Paper Company, 17.9 cents.

Samuel B. Hinsey Dead

Samuel B. Hinsey, Lockport, N. Y., superintendent at the former local Niagara Paper Mills, for about 22 years, died at the Lockport City Hospital, September 25, aged 76 years, following an extended illness. He retired from active service in 1935.

SPECIAL NOTICE

A Company operating in all parts of the world is in position to place orders for various paper and board for export,

for its own use — not for resale

Payments — New York Funds.

If you are a mill and interested in quoting prices and deliveries, write for specifications.

Orders are usually repeat business and may represent continuous tonnage.

PAPER

Glassine	Greaseproof
Coated	Book
Kraft	Waterproof (Kraft & Asphalt)

BOARD

Patent Coated	Clay Coated
Chip	

Address- Box 539, Louisville, Ky.

CONSTRUCTION NEWS

Kansas City, Kan.—The Sealright Company, Inc., Fairfax and Rickel roads, manufacturer of paper board bottle caps, a subsidiary of the Oswego Falls Corporation, Fulton, N. Y., which produces bottle cap board used by first noted company, has arranged for construction of one-story addition to plant, to be used for large increase in converting division. Structure will be erected by the Kansas City Industrial Land Company, Kansas City, on site adjoining present plant, and will be occupied under lease. It is reported to cost over $65,000, with equipment. Erection contract has been awarded to the Collins Construction Company, Davidson Building, Kansas City, Mo., and work will be placed under way at once. Charles E. Keyser, 609 Minnesota avenue, Kansas City, Kan., is architect.

Georgetown, S. C.—The Southern Kraft Corporation, manufacturer of liner board, corrugated board specialties, etc., a subsidiary of the International Paper Company, 220 East Forty-second street, New York, N. Y., will install new steel plate breechings for service at mill. Contract has been let to the Ingalls Iron Works Company, Birmington, Ala., for about 100 tons of such fabricated plate material, and work will be placed under way soon.

Newark, N. J.—The Pavey Envelope and Tag Company, 58 Colden street, manufacturer of paper tags, labels, envelopes, etc., has arranged for purchase of a three-story industrial building on local site at 19-21 Center street, totaling about 25,000 square feet of floor space, and will improve and equip for expansion. Large increased capacity will be carried out in converting department.

West Springfield, Mass.—The General Fibre Box Company, Inc., Circuit avenue, manufacturer of corrugated boxes and containers, has work in progress on new addition to plant, recently referred to in these columns, and will have structure ready for service this fall. It will be one-story, reported to cost close to $50,000, including equipment. The Ley Construction Company, 1215 Main street, Springfield, Mass., has the general erection contract. H. L. Sprague, 1570 Main street, Springfield, is architect.

Chicago, Ill.—The American Can Company, 104 South Michigan avenue, is reported to have leased industrial property near Chicago, and will use existing buildings for the production of fiber containers for shells for the Government. Equipment and facilities for large production will be provided, with new plant scheduled to be ready for operations early in 1942. It is understood that the Government will defray the cost of the equipment and hold title to same. Containers will be manufactured for shells of various sizes. As recently noted in these columns, the company also will provide a division for fiber box and container manufacture in new plant on South Kingshighway, St. Louis, Mo., for which superstructure will be placed under way soon. The entire St. Louis plant for all lines of output is reported to cost close to $2,000,000, including equipment.

Los Angeles, Calif.—The Pioneer-Flintkote Company, 55th and Alameda streets, Vernon, Los Angeles, manufacturer of roofing and building papers, etc., has taken out a permit for erection of a one-story addition to mill, for which general contract recently was let to Myers Brothers, 3407 San Fernando road, Los Angeles. It is reported to cost about $15,000, with equipment. Work is being placed under way. Company is an interest of Flintkote Company, 30 Rockefeller Plaza, New York, N. Y.

Chicago, Ill.—The Arrow Match Corporation, 3001 West Grand avenue, specializing in production of book matches, has plans for new addition to plant, including alterations and improvements in present three-story building. Increased production will be carried out in paperboard converting divisions and other departments. Cost reported close to $25,000. Bids are being asked on general contract and award will be made soon. Rissman & Hirschfeld, 65 East South Water street, are architects.

Chester, N. J.—The Seeley Tube and Box Company, 360 Thomas street, Newark, N. J., manufacturer of paper boxes and containers, paper tubing, etc., is continuing its expansion for increased production, largely to handle Government contracts, and has arranged for lease of entire former plant of the Stursneger Company, Chester. It will be improved and equipped for early service, and will be operated in conjunction with branch plant of company at Dover, N. J., in the same vicinity. Company also has arranged for lease of two one-story buildings of the former Granite Textile Mills, Montville, N. J., and similarly will improve and occupy for expansion.

Knowlton, Wis.—The Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., is making ready to begin work on new hydroelectric power plant at Knowlton, for service at its mill, for which a number of contracts have been let, as previously noted in these columns. Purchase will be made soon of about 340 tons of steel reinforcing bars for concrete service at plant site. The George W. Condon Company, Grain Exchange Building, Omaha, Neb., has begun work on site fill, estimated to require about 345,000 cubic yards of earth material, required for power dam. The General Electric Company, Schenectady, N. Y., will furnish the electric generators, while hydraulic turbines will be supplied by James Leffel & Company, Springfield, Ohio. Entire project is estimated to cost about $1,500,000. Thomas Utegaard is company engineer in charge of construction.

Los Angeles, Calif.—The California-Oregon Paper Mills, 2001 East 57th street, Vernon district, will construct a new steel water tower for service at local mill, specializing in production of tissue, waxed and other paper stocks. Cost is estimated at $15,000. Work is scheduled to proceed at once.

Laurel, Miss.—The Masonite Corporation, manufacturer of wood pulp board products, is continuing maximum operation at mill, which is now giving employment to more than 2000 persons. The plant is on a 24-hour day, seven-day week basis, current for a number of months past and to be maintained for an indefinite period. As previously announced in these columns, an expansion program is now under way at the plant, representing a total expenditure of about $1,500,000 for buildings and equipment.

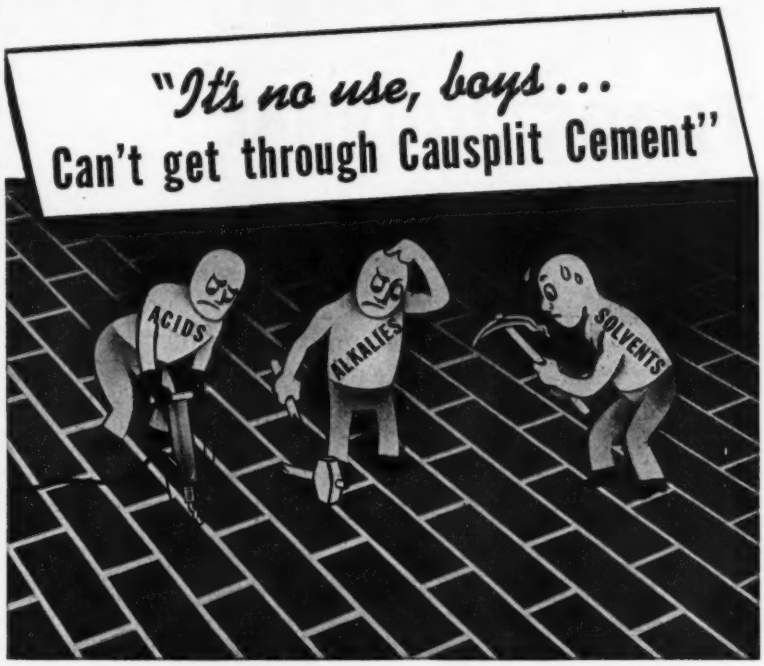
Show Scores Success

[FROM OUR REGULAR CORRESPONDENT]

SPRINGFIELD, Mass., October 6, 1941—The Paper Show at the recent Eastern States Exposition here in which several manufacturers had displays attracted large numbers of people.

The following exhibitors participated: Weyerhaeuser Timber Company, Rayonier, Inc., Tileston & Hollingsworth Company, The Fuchs & Lang Manufacturing Company, Strathmore Paper Company, The Parker Young Company, American Writing Paper Corporation, Brooks Bank Note Company, Brown Company, United States Envelope Company, The F. A. Bassette Company, Esleeck Manufacturing Company, Sandy Hill Iron and Brass Works, and American Type Founders, Inc.

The entire exhibit was assembled along both sides of aisle R using 84 feet of frontage. On one side of the aisle the exhibits were in individual booths. The Weyerhaeuser Timber Company occupying 24 feet of frontage; Rayonier, Inc., 12 feet of frontage; Brown Company, 12 feet of frontage; Tileston & Hollingsworth, 12 feet of frontage; The Parker Young Company, 12 feet of frontage, and the Springfield Advertising Club 12 feet of frontage. The 84 feet of frontage on the opposite side of the aisle was occupied by a colorful display of articles in common use made of paper or in which paper and cardboard played an essential part in wrapping or packing. These articles were placed on a raised platform 24 inches above the floor. The platform was covered with paper and at each end of the 84 foot vista two huge rolls of paper, one red and one white, were mounted in such fashion as to allow long stretches to be unrolled and festooned on the platform. At the rear of the platform a screen 8 feet high was built and covered with crepe paper in long pleats. The top of the screen was festooned with strips of red and blue paper thus making a red, white and blue background. Against this background there were arranged display panels for each of the participating exhibitors. Strathmore Paper Company, West Springfield, Mass., used a huge blown up photograph of one plant showing the valley and the surrounding mountains.



Its unique chemical resistance makes Causplit Cement a success where other cements fail. For Causplit readily handles a wide range of strong acids, alkalies and solvents at temperatures up to 350°F.

And Causplit is quick-setting, tough and durable, easy to apply, resistant to abrasion and to rapid changes in temperature. Proved admirable for corrosion-proof equipment lining in extensive industrial tests, Causplit Cement represents a considerable improvement over Penchlor Acid-Proof Cement and Asplit Cement, which have been successfully used in many industries for over 7 years.

CHEMICAL PLANTS profit by using Causplit because it resists hydrochloric, phosphoric and other strong acids, carbonates, sulfates and other salts, ammonia and various strong alkalies, phenol, toluol, alcohols, acetone and numerous other chemicals. Causplit Cement can be used in equipment handling alkalies and acids alternately—where other cements "wash out."

PAPER AND PULP MILLS find Causplit economical and durable for pulp digesters, bleaching system equipment, acid towers, recovery systems, etc. It withstands abrasion, repeated washings, sudden temperature changes, and chemicals used in the industry—including 50% caustic soda, soda ash, hypochlorites and chlorine, sulfurous acid, sodium sulfite, sodium sulfide, alum and others.

STEEL MILLS can use Causplit Cement for pickling, neutralizing and degreasing tanks and similar equipment because it is unaffected by sulfuric, hydrofluoric and hydrochloric acids, by strong alkalies, salts and solvents. Causplit maintains tight joints and preserves bricks, far outlasting other types of cement construction.

Penn Salt has been engaged for a great many years in the manufacture of acids and alkalies. We have naturally had considerable experience in the use of cements to resist corrosion, and are in a position to give technical advice. We will welcome inquiries on your problems.

PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA
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PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

Vol. 113 October 9, 1941 No. 15

COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

TAXES AND MORE TAXES

There can be little doubt that the new revenue bill will create a tax consciousness through the nation. The Revenue Act of 1941 is the heaviest and most inclusive tax bill ever enacted. It is expected to raise more than $3,500,000,000 annually and to increase government revenue to about $13,000,000,000, or close to 60% of the current estimates of expenditures.

One provision of the 1941 tax levy may possibly lay the preliminary ground work for a better tax plan in the future through the elimination of wasteful or unessential spending. This is the provision for a special committee of fourteen members to make a complete study of all federal expenditures for the purpose of recommending elimination and reduction of expenditures considered non-essential. This committee is to report to the president at the earliest practicable date. As the ultra modern theory of spending our way to prosperity, seems to have been revived on a wider scale, than when it was advocated in the days when government expenditures were more commonly grouped into hundreds of millions of dollars than as at present into billions, it may be expecting too much to eliminate even the non-essential expenditures in the present circumstances.

In commenting on the topic of still more taxes, the September 29 issue of the *Washington Review,* published by the Chamber of Commerce of the United States states: "Almost before the ink is dry upon the record-breaking tax measure, there is talk of more taxes. No one knows, within a couple of billion dollars, how much revenue the present laws will produce, nor the capacity of our people to handle the load. Yet, further taxes are in the Washington air. Badgered by inequitable and inconceivably bad provisions of the the income tax laws, and regulations under them, our business firms and individuals require a chance to breathe. They must have relief from the unjust hardships of such laws. There should be an immediate revenue bill to provide such relief. It is cynically remarked in Washington, however, that this suggestion may be dangerous, because, if some factotums are to have their way, a revenue bill to produce certainty and fairness may be turned into one of greatly increased taxes and new hardships. That will not be the case, however, if just and able members of the House and Senate committees dealing with taxation are given to understand the situation. The country also requires a respite from spend-thrift policies of expenditures of public funds."

The article raises the question: why should not the taxpayers tell Washington a few things: "First, to lose no time in reducing non-defense expenditures; let the government save just as the citizen must save if he is to survive the grievous tax burden. Second, to hold up on new taxes until it is seen what revenues can be produced under the present laws and how our citizens can perform under them; we have enough new taxes to digest for a while. Third, to pass without delay the technical revisions that are needed to make our tax laws certain and fair".

In discussing tax consciousness, the *Review* says in part that, "The tendency of Congress to show deliberation, and to satisfy itself about proposed measures, is attracting some attempts to arouse swifter and less inquiring action. The subject for immediate attempt may not have been fortunately chosen; for it is taxation. Congress is rather surfeited after spending six months without new taxes out of mind. Besides, it has been led to expect, around November, a tax bill dubiously described as technical although containing such controversial subjects as mandatory joint returns for husband and wife and the thwarting of the laws of community-property states. As if this were not enough, the Senate Finance Committee has outstanding a promise of hearings on old-age pensions for everyone, rich and poor, with proportionate taxes. Congress has learned, too, that the Treasury has finished a four-year task of turning out a long-needed codification of the administrative side of federal taxes, to be criticized by tax experts for the present but surely destined for Congress in the new year, when a towering budget in January and a corresponding tax bill of 1942 are already in prospect. Congress is decidedly tax conscious."

The surprise, which has been not inaptly referred to as the joker in the taxation pack, is referred to in the *Review* as follows: "Within six days after the bill levying more than four billion dollars in new taxes became law, however, there was sprung a proposal that all earnings of corporations in excess of 6% on invested capital should be taxed away. Mere mention of invested capital causes unpleasant recollections of its treatment in connection with the excess-profits tax. The following day it was announced Treasury

officials were briskly at work drafting a bill. The proposal was staged at hearings that have been spread into two months over the bill that was brought forward on August 1, for all manner of controls over prices, as means for preventing inflation from the combination of vast defense expenditures with restrictions on goods for civilian use. In the same forum there is to follow testimony from other official sources that inflation is best prevented by taxing away purchasing power, and by getting it at 'the corporate source' before distribution of receipts from defense expenditures. Congress may not for some time recover its breath. At any rate, the committees that have the duty of dealing with taxes have as yet shown no signs of taking notice."

A heavy burden of taxation is indicated for the future. Estimates announced by Harold D. Smith, Director of the Bureau of the Budget, as of October 5, raised defense expenditures for the current fiscal year, ended June 30, 1942, at $18,000,000,000, compared with a former estimate of $10,811,000,000. This is nearly three times that of the last fiscal year and amounts to $135 per capita, women and children included.

Trade in Old Papers Restricted

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., October 6, 1941—It is stated in the trade here that there was no trading in old papers last week on account of ceiling prices. If dealers could buy papers at low enough figures to sell at the ceiling prices they would do so.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks, 1941		Corresponding Weeks, 1940	
August 23	103.2	August 24	84.7
August 30	101.9	August 31	83.4
Sept. 6 (Holiday Week)	86.1	September 7	69.3
September 13	104.0	September 14	85.2
September 20	103.8	September 21	85.0
September 27 (Prelim.)	*105.2*	September 28	86.7

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1940	89.1	84.7	82.3	84.3	90.0	92.1	85.3
1941	85.6	89.7	92.2	96.4	98.9	99.5	94.8

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1940	85.1	81.5	85.5	84.9	80.9	85.6
1941	101.7	*99.5*	...	...	...	...

COMPARATIVE YEARLY SUMMARIES

	1935	1936	1937	1938	1939	1940	1941
Year to Date	68.8	78.4	85.9	69.6	79.8	86.2	*95.1*
Year Average	69.9	80.4	79.8	71.5	83.4	85.6	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	62	67	67	70	69	70	69	75	78	82	80	74	72
1937	80	86	86	88	85	77	66	74	69	65	55	45	73
1938	54	60	61	57	58	56	57	66	66	70	65	59	61
1939	60	67	71	69	64	67	63	72	74	84	81	71	70
1940	71	70	69	70	76	79	72	74	72	79	77	71	73
1941	75	81	82	83	84	88	86	94	*94*	..	..	..	..

Week ending Aug. 23, 1941—94 Week ending Sept. 13, 1941—98
Week ending Aug. 30, 1941—97 Week ending Sept. 20, 1941—99
Week ending Sept. 6, 1941—80 Week ending Sept. 27, 1941—*98*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

EXPORTERS
OF AMERICAN PULP

TO
BRITAIN
SOUTH AMERICA
AND ALL WORLD MARKETS

LYDDON
& COMPANY
(AMERICA) INC.

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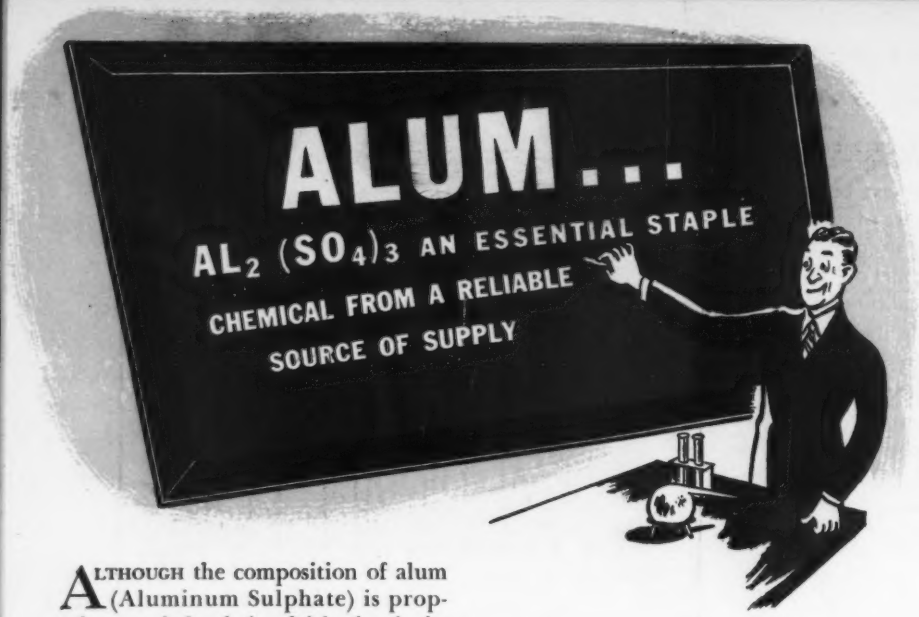


ALTHOUGH the composition of alum (Aluminum Sulphate) is properly regarded as being fairly simple, its reactions in the sizing of paper are very complex. For example, it is a fairly well established fact that when rosin soap reacts with alum, only a portion of the rosin is found in the precipitate as aluminum resinate. The balance is deposited on the fibers in the form of free rosin. The physical and chemical characteristics of the end products of this reaction are by no means always the same, as they are modified by many factors. Some of the more important agencies that influence the size-alum reaction are enumerated below . . . .

1. Presence of cellulose fibers
2. Kind of fibers
3. Temperature
4. Volume of water present
5. Age of the sized stock when formed into the sheet
6. Character of the water used

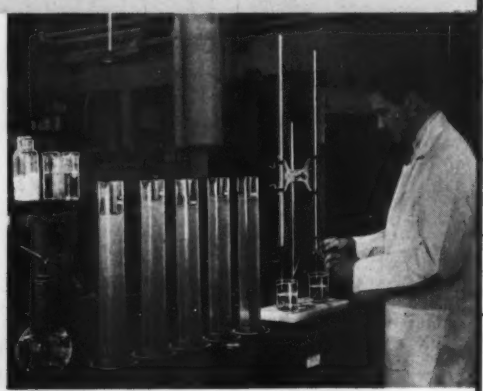
The foregoing considerations make it imperative that your alum should always be uniform and of highest quality to eliminate, as far as this product itself is concerned, variations in sizing reactions. Alum produced by Cyanamid is made under strict technical control by skilled operators. As a result, Cyanamid Alum is noted throughout the paper industry for its quality and uniformity. There are eight plants of the American Cyanamid & Chemical Corporation, strategically located for prompt and economical deliveries. These plants produce the various types of alum from the Company's own sources of raw materials. Included are Commercial (paper makers') Alum, Iron-Free Alum, and special grades to meet specific requirements. A Cyanamid representative will be glad to discuss your particular alum and other paper chemicals requirements with you, and to extend the services of the Cyanamid Laboratories to help you solve your chemical problems.

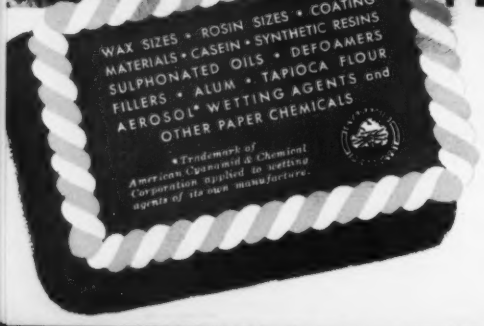
Solution of Sulphate of Alumina at 60° F

°Bé	Sp. Gr.	% Al_2O_3	Lbs. Al_2O_3 per cu. ft.	Lbs. 17% Alum/cu.ft.
1.0	1.0069	0.20	0.13	0.74
2.0	1.0140	0.40	0.25	1.49
3.0	1.0211	0.61	0.39	2.24
4.0	1.0284	0.83	0.53	3.13
5.0	1.0357	1.04	0.67	3.95
6.0	1.0432	1.26	0.82	4.82
7.0	1.0507	1.48	0.97	5.71
8.0	1.0584	1.70	1.12	6.60
9.0	1.0662	1.92	1.28	7.51
10.0	1.0741	2.14	1.43	8.44
11.0	1.0821	2.34	1.58	9.29
12.0	1.0902	2.54	1.73	10.16
13.0	1.0985	2.75	1.89	11.09
14.0	1.1069	2.97	2.05	12.07
15.0	1.1154	3.21	2.23	13.19
16.0	1.1240	3.43	2.41	14.15
17.0	1.1328	3.66	2.59	15.22
18.0	1.1419	3.89	2.77	16.30
19.0	1.1508	4.16	2.99	17.57
20.0	1.1598	4.36	3.17	18.62
21.0	1.1694	4.60	3.36	19.74
22.0	1.1789	4.82	3.55	20.86
23.0	1.1885	5.04	3.74	21.99
24.0	1.1983	5.27	3.94	23.18
25.0	1.2083	5.50	4.15	24.39
26.0	1.2185	5.75	4.37	25.71
27.0	1.2288	6.00	4.60	27.06
28.0	1.2395	6.25	4.83	28.41
29.0	1.2500	6.49	5.06	29.78
30.0	1.2609	6.74	5.30	31.18
31.0	1.2719	7.00	5.56	32.68
32.0	1.2832	7.25	5.81	34.16
33.0	1.2946	7.51	6.07	35.69
34.0	1.3063	7.78	6.34	37.30
35.0	1.3182	8.05	6.62	38.94

Illustrated here is one of the eight plants of the American Cyanamid & Chemical Corporation where alum for the paper industry is produced.

At the Cyanamid paper laboratory, developments are constantly under way to further improve quality and uniformity of paper chemicals, both staples and specialties. At right is chart compiled for reference in use of alum.




WAX SIZES • ROSIN SIZES • COATING
MATERIALS • CASEIN • SYNTHETIC RESINS
SULPHONATED OILS • DEFOAMERS
FILLERS • ALUM • TAPIOCA FLOUR
AEROSOL® WETTING AGENTS and
OTHER PAPER CHEMICALS
*Trademark of American Cyanamid & Chemical Corporation applied to wetting agents of its own manufacture.

American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

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DISTRICT OFFICES: 89 Broad Street, Boston, Mass.; 600 South Delaware Avenue, Philadelphia, Pa.; Russell & Bayard Streets, Baltimore, Maryland; 3333 Wilkinson Boulevard, Charlotte, N. C.; 850 Leader Building, Cleveland, Ohio; 20 North Wacker Drive, Chicago, Ill.; Miller Road, Kalamazoo, Michigan; 931 Fisher Building, Detroit, Michigan; 900 Shell Building, St. Louis, Missouri; Azusa, California

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

A Kinetical Theory of the Sulphite Cooking Reaction

By G. Goldfinger[1]

Abstract

The mechanism proposed to explain sulphite cooking reactions in terms of varying order, rate of reaction and energy of activation is based on the hypothesis of a reaction step of activated adsorption preceding the reaction between lignin and SO_2.

In a previous publication *(6)* it was shown that both the order and the energy of activation of the sulphite cooking reaction as investigated by O. Maass and collaborators *(4)* are variables of the degree of delignification. It seems obvious that this reaction is not governed by one single rate-determining step, but that a group of interacting elementary reactions are accountable for the reaction rate.

The purpose of the present paper is to examine again the experimental results of Maass and collaborators *(3)* which doubtlessly are among the most accurate experiments carried out in this field, and to evolve a simple mechanism that will explain the sulphite cooking reaction in terms of varying order, varying relative rate of reaction, and varying energy of activation. In this simplification the influence of the cellulose-cooking agent reaction is omitted except in the evaluation of the adsorbing surface of the wood.

A hysteresis of the sorption curves of various gases, vapors and solutes on wood and cellulose is shown in the literature *(7, 9, 10)*. This phenomenon shows clearly that a certain amount of the sorbed gas is retained by forces greater than those accountable for ordinary surface adsorption. A consideration of the sodium hydroxide adsorption curves of Maass *(9)* indicates that there is a certain area, chemically or physically distinct on the surface of wood and cellulose, where activated adsorption occurs.

Equations Assumed in Mechanism

The hypothesis of a reaction step of activated adsorption preceding the reaction between lignin and sulphur dioxide is the basis of the mechanism here proposed. The following three groups of elementary equations are assumed in the mechanism:

$$1,1.\ [A] + [N] \rightarrow [AA] + [N] \qquad v_{1,1} = \frac{d[AA]}{dt} = k_{1,1}[A][N]$$

$$1,2\ [AA] + [L] \rightarrow [SL] \qquad v_{1,2} = \frac{d[SL]}{dt} = k_{1,2}[AA][L]$$

$$1,3.\ [SL] \rightarrow [X] \qquad v_{1,3} = \frac{d[X]}{dt} = k_{1,3}[SL]$$

$$2,1.\ [G] + (S_o - A) \rightarrow [A] \qquad v_{2,1} = \frac{d[A]}{dt} = k_{2,1}[G](S_o - A)$$

$$2,2.\ [A] \rightarrow [G] + (S_o - A) \qquad v_{2,2} = -\frac{d[A]}{dt} = k_{2,2}[A]$$

$$2,3.\ [A] + [N] \rightarrow [AA] + [N] \qquad v_{1,1} = \frac{d[AA]}{dt} = -\frac{d[A]}{dt}$$

$$3,1.\ K = [N_o]$$

$$3,2.\ [N] + [L] \rightarrow 2[N] \qquad v_{3,2} = \frac{d[N]}{dt} = k_{3,2}[N][L]$$

$$3,3.\ [N] \rightarrow [L] \qquad v_{3,3} = -\frac{d[N]}{dt} = k_{3,3}[N]$$

$$3,4.\ \frac{k}{[L]}$$

Where G is the sulphur dioxide in solution; A is the sulphur dioxide adsorbed; AA is the sulphur dioxide activated adsorbed; S_o is the original surface of wood; N is the number of active points on the surface; K is the number of active points on original surface; L is the lignin; SL is "sulpholignin"; X is removed lignin; and k_{xy} and k are constants.

Equation 1, 1 expresses the approaching of an adsorbed sulphur dioxide group in the range of an activated point and its eventual adsorption which probability is expressed by $k_{1,1}$. The products of this reaction are assumed to be an activated adsorbed molecule and a reappearance of an activated point. As a matter of fact, it is more likely that this reaction should be expressed by the equation, [A] + [N] → [AA], but this form would induce an extreme complication of the final equation. Accordingly the choice lies between assuming Equation 1, 1 or considering it as unimportant in relation to the equations of Group 2 and neglecting it here. This latter approach is entirely justified and common practice when handling surface reactions *(5)*. Equation 1, 2 is the reaction between activated adsorbed sulphur dioxide and lignin and gives the product "sulpholignin". Equation 1, 3 is the "hydrolysis" of this sul-

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pholignin resulting in the disappearance of the lignin from the wood. Assuming, as usual, constant concentrations of intermediary products *(1, 2)* the following equations are evolved:

$$k_{1,1}[A][N] = k_{1,2}[AA][L] \; ; \; k_{1,2}[AA][L] = k_{1,3}[SL]$$
$$k_{1,1}[A][N] = k_{1,3}[SL]$$
$$\frac{d[X]}{dt} = k_{1,3}[SL] = k_{1,3}[A][N]$$

It is without influence on the form of the rate expressing equation, $d[X]/dt = k_{1,1}[A][N]$, if a difference is made between *AA*, the activated adsorbed compound, and *SL*, the sulpholignin compound.

To use the equation $v_{1,1} = k_{1,1}[A][N]$, both *A* and *N* have to be replaced by expressions containing only *G* and *L* as variables. *A* is found by a similar calculation to the one previously used:

$$k_{2,1}[G](S_o) - k_{2,1}[G][A] = k_{2,2}[A]$$
$$k_{2,1}[G](S_o) = k_{2,1}[G][A] + k_{2,2}[A]$$
$$= [A](k_{2,1}[G] + k_{2,2})$$
$$[A] = \frac{k_{2,1}[G](S_o)}{k_{2,1}[G] + k_{2,2}} = \frac{(S_o)}{1 + \frac{k_{2,2}}{k_{2,1}[G]}}$$

Equation 2, 1 expresses the probability of sorption, which is proportional to the concentration of *G*, since the number of collisions of sulphur dioxide and the sorbtive surface is proportional to *G*. This probability is also proportional to the free sorbtive surface ——i.e., the original surface minus the surface covered by sorbed molecules. This final value is proportional to the amount of sorbed molecules. Equation 2, 2 is the inverse reaction, namely the desorption proportional to the amount of sorbed molecules. Equation 1, 1 must be neglected for reasons of simplicity, but obviously the right to do so is unquestionable because the Reactions 2, 1 and 2, 2 are much more important than 1, 1. Moreover, the energy of activation of the sorbtion reactions is not greater than 10^3 calories, whereas the energy of activation of 1, 1 is of the order 2.10^4 calories.

A detailed discussion of the third group of reactions and the following calculations are necessary:

$$[N] = K + k_{3,2}[N][L] - k_{3,3}[N] - \frac{k}{[L]}$$
$$[N] + k_{3,3}[N] - k_{3,2}[N][L] = K - \frac{k}{[L]}$$
$$[N](1 + k_{3,3} - k_{3,2}[L]) = K - \frac{k}{[L]}$$
$$[N] = \frac{K}{1 + k_{3,3} - k_{3,2}[L]} - \frac{k}{(1 + k_{3,3} - k_{3,2}[L])[L]}$$

By introducing a new constant $k_{3,1}$ and replacing *k* and *K* accordingly, the following equations are derived:

$$k = k_{3,1} + k_{3,1}\,k_{3,2}; \text{ and } K = K^* + k_{3,2}\,k_{3,1}$$
$$= k_{3,1}(1 + k_{3,3}) \qquad K^* = K - \frac{k}{1 + k_{3,3}}$$
$$k_{3,1} = \frac{k}{1 + k_{3,3}}$$
$$[N] = K + k_{3,2}[N][L] - k_{3,3}[N] - \frac{k}{[L]}$$
$$[N] = K^* + k_{3,2}\,k_{3,1} + k_{3,2}[N][L] - k_{3,3}[N] - \frac{(k_{3,1} + k_{3,1}\,k_{3,3})}{[L]}$$
$$K^* = [N] - k_{3,2}[N][L] + k_{3,3}[N] - k_{3,2}\,k_{3,1} + \frac{k_{3,1} + k_{3,1}\,k_{3,3}}{[L]}$$
$$K^* = [N]\,(1 - k_{3,2}[L] + k_{3,3}) + \frac{k_{3,1}}{[L]}\,(1 + k_{3,3} - k_{3,2}[L])$$
$$\frac{K^*}{1 + k_{3,3} - k_{3,2}[L]} = [N] + \frac{k_{3,1}}{[L]}$$
$$[N] = \frac{K^*}{1 + k_{3,3} - k_{3,2}[L]} - \frac{k_{3,1}}{[L]}$$

K is the original number of points at the lignin surface available for activated adsorption. In order to know the number of active points at the surface at any moment of the delignification, it is necessary to add to *K* the Equation 3, 2. This expresses the formation of an active point from a lignin molecule. If it is assumed that originally an active point was located at the limit of two lignin molecules, where for one reason or another some intermolecular forces were not neutralized, it is easy to see that the disappearance of one of these lignin molecules will eventually not influence the existence of the first active point but will actually create a new one. The disappearance of active points, as expressed by Equation 3, 3, also must receive consideration. Since the existence of an active point was attributed to a disturbance of the surface, it is clear that where the swollen and heated surface is maintained during the reaction, a tendency of rearrangement has to be considered. It is not a necessity, however, to maintain this equation, from the point of view of the final equation, since the constant $k_{3,3}$ of the total rate expression can be incorporated in other constants. By arbitrating the "reactivity" of the lignin molecule to the constitution of the polymers of which it forms a part and if the possibility of reaction is proportional to the number of elements building up the polymers, then Equation 3, 2 would signify that by the reaction of one part of the polymers, the rest becomes twice as reactive. On the other hand, Equation 3, 3 expresses the formation of a polymer which is less reactive. Of course, in the actual case so little is known about the reaction that it does not merit attributing any explanations to it more than an attempt to visualize the situation. Finally, $k/[L]$ is reached. A certain increasing fraction of the lignin will necessarily become nonreactive during the reaction, regardless of whether the reactivity is attributed to active points or conditions of polymerization. This nonreactive fraction, however, appears as lignin in the chemical analysis. At the beginning of the reaction, when the nonreactive fraction of lignin can be neglected in face of the reactive fraction, it makes no difference in the rate. At the end of the reaction, however, this fraction of nonreactive lignin makes the relative rate of delignification appear appreciably lower than it really is. A correction $k/[L]$ may be applied by accepting the rate decrease as fact since no experimental method is available to distinguish in the analysis between the two kinds of lignin.

The usual calculation gives the expression of the concentration of *N*. By replacing in $k_{1,1}[A][N]$ the *A* and *N* by the functions here derived, the final equations for the absolute and relative rate of the delignification reaction become:

$$V = \frac{d[X]}{dt} = \frac{k_{1,1}[S_o]}{1 + \frac{k_{2,2}}{k_{2,1}[G]}} \qquad \left(\frac{K^*}{1 + k_{3,3} - k_{3,2}[L]} - \frac{k_{3,1}}{[L]}\right)$$

Before discussing the experimental verification of this equation, a few words about S_o may be in order. The original surface was considered in Equations 2,1 and 2,2. To be correct, provision should be made for the variation of the surface due to the disappearance of cellulose and noncellulose during the reaction. The surface of wood, expressed in unity of surface proportionally to unity of weight, is closely equal to the surface of cellulose *(11)*. Since during a pulping reaction roughly half of the original quantity

disappears, the assumption is made that the surface S is equal to $[L]\ S_0/2 + S_0/2$. If K^* is finally replaced by $K - k_{3,2}k_{3,1}$, the final definitive form of the equation becomes:

$$v = \frac{d[X]}{dt} = \frac{k_{1,1}\left(\frac{[L]S_0}{2} + \frac{S_0}{2}\right)}{1 + \frac{k_{2,2}}{k_{2,1}[G]}}\left(\frac{K - k_{3,2}k_{3,1}}{1 + k_{2,2} - k_{2,2}[L]} - \frac{k_{3,1}}{[L]}\right)$$

With the experimental results at hand, this equation may be verified in two steps—i.e., by first considering experiments carried out at variable sulphur dioxide concentrations *(3)* in which the lignin concentration is taken as constant in the average, and second, by experiments *(4)* in which the sulphur dioxide was maintained constant.

In Fig. 1 the relative rate (absolute rate over sulphur dioxide concentration) is plotted against the concentration of sulphur dioxide. The line shows the calculated curve if $Fk_{1,1}k_{2,1}$ is equal to 0.67, $k_{2,1}$ is 0.013, and $k_{2,2}$ is 1.0. Of course, these constant values are arbitrary and have no kinetical significance as such. It shall only be shown that this part of the proposed equation describes roughly the corresponding expiremental results. It shows also that a first order relation which should be a horizontal line cannot be assumed since the deviations of such a line are without doubt real and not due to experimental error. Figure 2 represents similarly the second part of the equation and the corresponding reactions. Here the constants are K^*: 1.0, $k_{3,2}$:0.25, $k_{3,2}$:1.0, $k_{3,1}$:0.03, and finally F expressing the part of the equation assumed to be constant 0.59. The calculated curve shows clearly that its general shape is similar to the shape of the experimental curve. There is no apparent reason to make this curve fit better which would have been doubtlessly possible by choosing the constants more carefully. The curve is intended to show that an activated adsorption mechanism represents the effect of the variation of the relative rate of reaction.

Energy of Activation

The evidence would not have been better even if a closer coincidence had been obtained of the experimental points and the theoretical curve for the reason

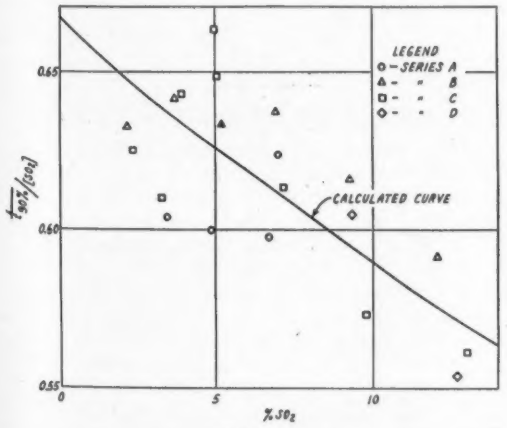

FIG. 1

Relative Rate ($\frac{1}{t_{90\%}}$ $[SO_2]^{-1}$) as Variable of Free SO_2 Concentration. Curve According to the Proposed Mechanism.

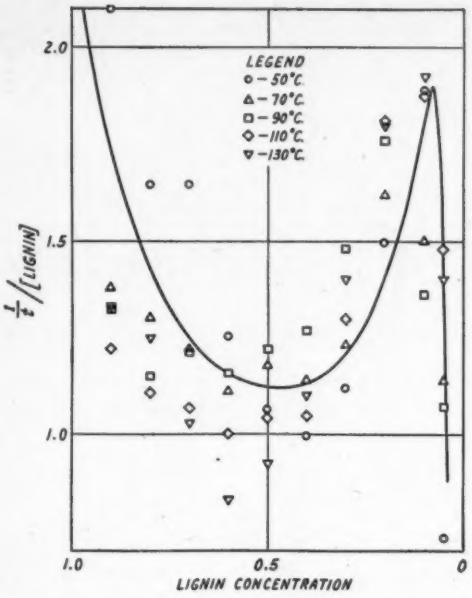

FIG. 2

Relative Rate ($\frac{1}{t}$ (Lignin)$^{-1}$) as Variable of the Concentration of the Remaining Lignin. Curve According to the Proposed Mechanism.

that the theoretical curve is but an approximation. A better similarity of the curve with the facts would have been purely coincidental and without value. Accordingly the omission of the consideration of the variations of the constant $k_{1,1}$ was justifiable.

Since the energy of activation of the reaction varies with the degree of delignification, the curve representing the rate of reaction cannot be simply multiplied by a certain factor to fit a given temperature but instead must be multiplied by a function of decreasing importance for increasing delignification. For reasons of simplicity this point was omitted in considering the variation of the constant $k_{1,1}$. The omission is justified, however, because for a first approximation it would have been necessary to find the equation with the lowest number of constants. Nevertheless it seems worthwhile to mention the variation of the energy of activation in the light of this mechanism.

The energy of activation in the proposed mechanism would be expressed entirely or at least in a major fraction by the constant $k_{1,1}$. This is evident if one considers the possible temperature variations of the other reactions, the constants of which appear in the final equation. The constant $k_{1,1}$ is, however, the constant of the reaction of the activated adsorption. The activated adsorption may be expected to occur at points which are not only different from the normal surface but are generally different among themselves, since the assumption was made that they correspond to disturbances in the structure of the surface. If these points are different one from the other they will be different from the standpoint of the energy of activation of the adsorption on them as is shown in the case of the activated adsorption in general. It is likely also that there will be more points characterized by a lower energy of activation. These points will be first occupied and the temperature variation of the reaction will correspond to this energy of activation. After all these points have been occupied, of course, only the ones with higher energy

TABLE I.—THE RELATIVE RATE OF REACTION AS DEDUCED FROM THE DATA OF MAASS(3)

Series	Average combined sulphur dioxide, %	Free sulphur dioxide, %	Time to reach 90% delignification t_{90}%, hours	Absolute rate of reaction: $\frac{1}{t_{90}\%}$	Relative rate of reaction: $\frac{1}{t_{90}\% \cdot [SO_2]}$
A	0.17	1.54	13.28	.075	.049
		3.50	4.74	.211	.060
		4.89	3.41	.293	.060
		6.75	2.48	.403	.060
B	0.40	2.18	7.26	.138	.063
		3.69	4.23	.237	.064
		5.19	3.04	.329	.063
		6.94	2.26	.443	.064
		9.26	1.75	.572	.062
		12.06	1.40	.715	.059
C	0.90	2.40	6.68	.150	.063
		3.23	5.08	.197	.061
		3.95	3.94	.254	.064
		4.97	3.04	.329	.066
		5.04	3.07	.326	.065
		7.14	2.28	.438	.061
		9.78	1.78	.562	.057
		13.00	1.37	.730	.056
D	1.40	6.24	2.31	.433	.070
		9.35	1.77	.565	.061
		12.65	1.43	.700	.055

will be available, and consequently the energy of activation of the reaction will be higher and so on.

In short, the main steps of this reaction are, as expected, a surface adsorption, followed by an activated adsorption, and then the real "reaction." An adsorption mechanism represents the part of the reaction which is carried out under conditions where one can assume everything constant but the concentration of the cooking agent. Only one other mechanism would have represented the same effect—i.e., the mechanism of an unimolecular photochemical reaction. No argument seems necessary to explain why it was not considered. In the same way there is no other mechanism except one, based on the ratio of active points to reacting surface, that would show the variations of the rate of reaction as deduced here from the experimental results of Maass. Finally, since there is a reaction, it had to be given some place in the mechanism. Despite these arguments, it would not greatly change the interest in the mechanism even if it should appear that it is entirely wrong. The research of the cooking process was on a purely chemical basis. All explanations proposed and called mechanisms are stoichiometrical formulas and do not contain the two essential characteristics of a mechanism—i.e., a mathematical expression of the fact and an estimation of the relative importance of the different steps. Once a mechanism has been set up as a working hypothesis, attempts can be made to verify or refute each step of it and thus the true mechanism may be found in which eventually not one of the steps of this first

TABLE II.—THE RELATIVE RATE OF REACTION AS DEDUCED FROM THE DATA OF MAASS(4)

Temperature, deg. C.	50		70		90		110		130
Factor	486.5		81.55		15.25		3.71		
[L] Lignin concentration in %/100 of original	Relative rate	Corrected to 130 deg. C.	Relative rate	Corrected to 130 deg. C.	Relative rate	Corrected to 130 deg. C.	Relative rate	Corrected to 130 deg. C.	Relative rate
.9	.0043	2.10	.0170	1.38	.086	1.32	.33	1.22	1.3
.8	.0034	1.65	.0160	1.30	.075	1.15	.30	1.11	1.3
.7	.0034	1.65	.0150	1.22	.079	1.21	.29	1.07	1.0
.6	.0026	1.26	.0137	1.11	.076	1.16	.27	1.00	0.8
.5	.0022	1.07	.0145	1.18	.080	1.22	.28	1.04	0.9
.4	.0021	1.00	.0140	1.14	.083	1.27	.28	1.04	1.1
.3	.0023	1.12	.0152	1.23	.097	1.48	.35	1.30	1.4
.2	.0031	1.50	.0200	1.62	.115	1.76	.49	1.81	1.8
.1	.0039	1.89	.0185	1.50	.089	1.36	.505	1.87	1.9
.05	.0015	0.73	.0140	1.14	.070	1.07	.40	1.48	1.4

(Corrected to 130 deg. C. means that the rate is multiplied by the mentioned factors in order to get all data in one figure)

attempt may even appear. There is little fear, however, that this final mechanism will be found very soon, and that consequently nothing more need be done in the kinetical research of the cooking process, since in even about the simplest mechanisms of gas reaction the discussions are not yet closed after decades of research.

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TAPPI Notes

George W. Brumley, formerly of the St. Joe Paper Company is now chief chemist for the St. Marys Kraft Corporation, St. Marys, Ga.

J. L. McCarthy, formerly of the Fraser Companies, Ltd. is now on the Department of Chemistry staff of the University of Washington, Seattle.

John W. Gilkey, formerly of the Bryant Paper Company is now a graduate student at the University of Michigan.

William Zwecker, formerly of the North American Pulp and Paper Company is now assistant to the General Manager and in charge of development work at the Filer Fibre Company, Filer City, Mich.

The Upper India Couper Paper Mills Company of Lucknow, India is now a corporate member of the Technical Association.

The next meeting of the TAPPI Pacific Section will be held at Camas, Wash., on November 9th.

The TAPPI Ohio Section will meet at the Hotel Manchester, Middletown, Ohio, on Thursday, October 23rd. Harold W. Greider, director of research for the Philip Carey Manufacturing Company, Cincinnati, Ohio, will talk on "Some Aspects of Research on Asphalt and Asbestos Products."

Buy Paper Under Walsh-Healey Act

WASHINGTON, D. C., October 8, 1941—Government purchases of paper under the Walsh-Healey act for the week ended September 20, amounted to $356,354.11, with the following orders:

$18,739 worth of manifold paper for War QMC N. J. from North American Pulp and Paper Corporation; $50,343.33 worth of manifold paper for same from W. A. Johns Paper Company; $81,467.51 worth of paper towels for War Med. Brooklyn from Chas. F. Hubbs & Co.; $38,000 worth of unsensitized blueprint paper for War Aid Corps from Chas. W. Speidel & Co.; $76,200 of same for War Air Corps from H. P. Andrews Paper Company; $11,700 worth of chipboard for War Ord. N. J. from Ringel Brothers; $79,904 worth of target paper for War Ord. Ill., from Bradner Smith & Co.

A Method for Evaluating the Surface Roughness of Paper*

By M. Heinig[1] and P. K. Baird[2]

Abstract

An apparatus and procedure are described, giving a method by which the irregularities of essentially stress-free paper surfaces may be measured directly, expressed numerically, and the "roughness" statistically evaluated. The effects of the chief variables of the method are determined and the optimum test conditions specified.

The use of test data to determine the magnitude-frequency distribution of paper surface irregularities is shown by curves. The relation of roughness to Ingersoll gloss values is discussed. Roughness values are given showing test results on various printing papers.

The apparatus developed required further refinement for routine testing but is suitable in its present form for research on paper surface problems.

The prime importance of surface roughness to the printing quality of papers has long been recognized, and because current methods of measurement are indirect and are based on assumed relations in most instances, the development of a method for measuring this property of paper in a direct manner was undertaken.

It has been found advisable to use the term "roughness" instead of "smoothness" in connection with the apparatus and procedure developed. This usage results from the fact that *roughness* is capable of being defined readily in terms of the readings on the apparatus, whereas this is not the case with *smoothness.*

Previous Developments in Roughness Testing

The roughness of papers has been shown by Bekk *(1)* and Larocque *(2)* and others to be one of the most important factors determining the printing quality of paper.

An enlightening discussion of the principles of surface evaluation in general is given by Abbot and Goldsmith *(3)*. The problem of measuring paper surface roughness has been approached by many different methods. A review of a number of these is given by W. Brecht *(4)*, who sketches the development of roughness testing, beginning with the subjective methods of sight and touch. As a more precise method was demanded the technique changed to the use of gloss measurements, which, although giving a numerical test result, depended upon optical characteristics and neglected surface form. When it was found that practically nothing could be done with gloss measurements in the field of machine-glazed papers, Brecht states that a bold leap was made across the definitionless space and there resulted a deluge of measuring apparatus, each of which was based on an entirely different and sometimes arbitrary definition of smoothness.

In general, roughness testers are either of the type that measures surface irregularities directly or that measure some more or less closely related quality giving an indirect type of evaluation.

The first type usually consists essentially of a feeler or detector point which contacts the test surface, the motion of the point indicating the amount of surface irregularity. The second type depends on friction, air flow, light reflection, electrical capacitance, or some such quantity, assumed to depend upon the amount of surface irregularity.

The direct type usually gives the result in the form of a curve or a series of readings showing the variation of the surface from point to point, whereas the indirect type gives one integrated value representing the entire test area. Although the latter has the advantage of speed, it is obviously incapable of yielding any information about the magnitude distribution or arrangement of the surface irregularities. Furthermore, because the indirect type of method is based on an assumed relation, the results are questionable as regards surface form. Of this type the best known of those depending on air flow are the Bekk, the Gurley, and the Williams testers.

None of the methods of the direct type have become very widely known. A representative example of this type is the method of Schmalz *(5)* which is discussed by Brecht *(4)*. A feeler point scans the surface in a line as the specimen is drawn along; a mirror magnifies the motion of the feeler and records it photographically. This method is intended to give a profile of the surface of the paper but the results are open to serious question due to the drag of the feeler point which would produce a plowing effect on the paper. Brecht also states that with the specific pressure of 1 kg. per square centimeter on the feeler, the hardness of the paper would likely play a considerable part in this test.

The tester developed by H. Flemming *(6)* is also of the direct type. It uses a steel ball 1 mm. in diameter as a detector needle and automatically totals the movements of the arm in which the ball is mounted for a given length of path. This method evidently is able to operate with a load only half that required to deform hard papers, but it is unlikely that such a feeler would be small enough to detect properly many of the irregularities of commonly used printing papers, particularly with the rolling motion employed. The lateral stress of such a motion might be objectionable also.

Another method of the direct type is that of Way *(7)*, which is optical in nature, and imposes little stress on the paper. It is claimed that it will indicate the true profile.

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[3] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

Apparatus and Procedure

The principle of measurement utilized in the Forest Products Laboratory roughness tester consists of the direct determination by mechanical means of the deviations from a fixed plane of the paper surface at a series of points . In this way the method employs the tracer principle used by several other instruments. An important difference, however, is that in the present method the detector needle makes contact by means of an intermittent vertical motion which eliminates the objectionable side stresses and plowing effect of continuous tracing.

The assembly of the chief working parts is shown in Fig. 1 and the operation of the instrument is shown schematically in Fig. 2.

The paper to be tested is held by a clamp consisting of the fixed upper contact piece (a) and the movable lower contact piece (b) Fig. 2, A. The upper contact piece has a 0.254 mm. diameter hole through which the detector needle (c) makes contact with the paper surface. The lower contact piece rests on a pivot (i) to permit its surface to align itself freely with the lower surface of the paper. This insures intimate contact between the upper contact piece and the paper. Clamping force is applied by means of a pivoted arm (h) with an adjustable weight (j) permitting control of the force applied.

The zero point on the scale of the tester is established by allowing the two contact pieces to come together, thus letting the detector needle rest on the lower contact surface. The detector needle is then in the zero position. When a strip of paper is clamped between the contacts, the detector needle will rest on the paper surface and its position will indicate the vertical distance by which the upper paper surface deviates below or above the zero position. The detector needle movement is magnified 3250 times by

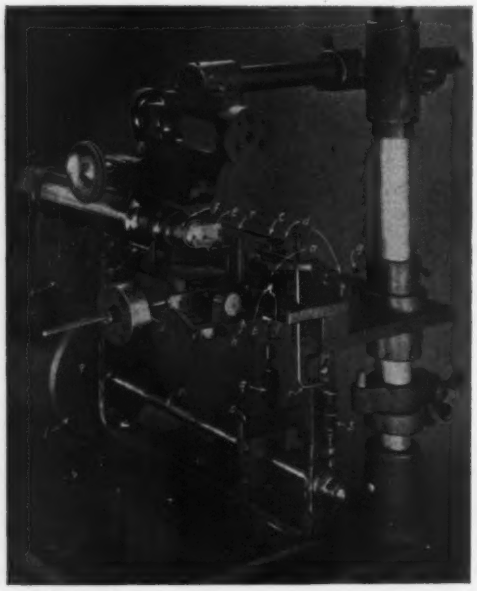

FIG. 1

Instrument for Determining the Roughness of Paper. a—Upper Contact Piece. b—Lower Contact Piece. c—Detector Needle. d—Pivoted Indicator Arm. e—Glass Plate. f—Microscope Objective Lens. g—Indicator Arm Counter Balance Weight. h—Pivoted Clamp Arm. i—Lower Contact Piece Pivot. j—Adjustable Clamp Weight. k—Upper Cyclometer Wheel. l—Lower Cyclometer Wheel. m—Threaded Shaft. n—Block. o—Cam Frame. p—Cam Shaft. q—Turnbuckle. r—Indicator Arm Lifter Rod. s—Turnbuckle.

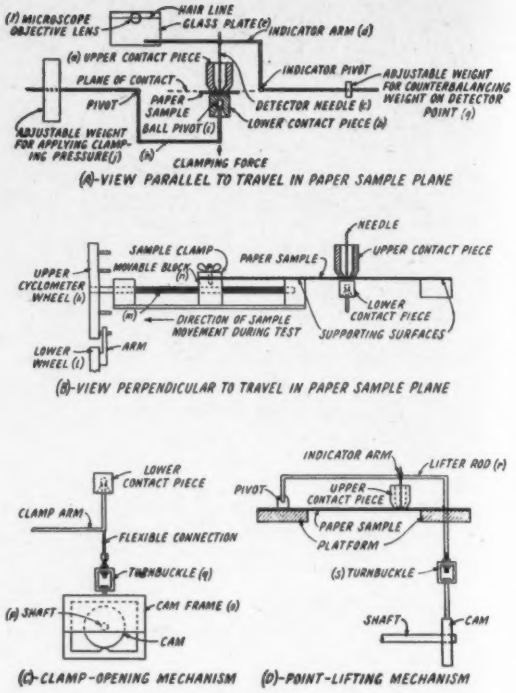

FIG. 2

Schematic Diagram Showing Operation of Instrument

means of a combination of merchanical and optical devices. This is done by mounting the detector needle on a pivoted indicator arm (d) carrying a glass plate (e) with an attached glass filament hairline. The image of the hairline is projected by a lamp and microscope (f) to a distant scale.

The detector needle load, which must be as small as possible and still permit positive contacting action, is adjusted and controlled by a counterbalance weight (g) on the pivoted lever arm to which the detector needle is attached. A load of approximately 0.05 gram is employed on the detector needle.

The detector needle consists of a steel stylus the point of which is ground to a truncated cone having a flat end 0.033 mm. (0.0013 inch) in diameter. The flat form of the point facilitates duplication of the shape in making the points and in standardizing the point size.

In order to take a series of readings along the surface, the paper strip is moved along in small, equal steps by means of a cyclometer arrangement shown in Fig. 1, B. This consists of two wheels, the upper (k) having 10 teeth and the lower a projecting arm. The lower wheel (l) is turned manually by a crank, intermittently engaging the upper wheel and turning it one tenth of a revolution each time. The upper wheel turns a shaft (m) threaded through a block (n) to which the paper is clamped, and by which the paper is pulled stepwise horizontally by a constant amount of 0.0787 mm.

The contact pieces are separated by a downward pull originating from the action of a frame (o) surrounding a cam which is mounted on the same shaft (p) as the lower cyclometer wheel. The pull is transmitted through a flexible connecting chain to the clamp arm on which the lower contact piece is pivoted as shown in Fig. 2, C. The clamp arm, when re-

leased by the cam, brings the contacts together by the action of the clamp weight. A turnbuckle (q) connects the chain and cam frame to permit adjustment of the clamp opening, thus controlling the impact of the lower contact piece against the paper. The detector needle is raised from the paper by the action of a cam attached to the same shaft (p) as the clamp-opening cam, the lift of the cam being transmitted by a rod (r) passing under the indicator arm carrying the detector needle as shown in Fig. 2, D. After lifting the arm, the cam gradually allows it to drop by its own weight and rest on the paper. The lift of the needle above the zero position is about 0.0076 mm. and is adjusted by a turnbuckle (s).

The small lift and slow descent of the needle point tend to minimize impact and consequent penetration into the paper. The speed of descent depends upon the speed with which the shaft is turned, which is approximately 0.5 revolutions per second. The relation of the angular positions of the cyclometer arm, needle-lifting cam, and clamp-opening cam is arranged so that the following cycle is obtained: the clamp opens, the paper sample is advanced and stopped, the clamp closes upon the paper, and the detector needle descends to the paper and then rises.

Test Procedure

Conditions: The apparatus must be kept in a constant temperature (± 0.5 deg. C.) room to avoid errors due to dimensional changes in the metal parts. The use of the optical projection system necessitates darkening the room except for a small shaded light for recording readings. The apparatus should be protected from dust to prevent errors in measurement.

Calibration and adjustment: In order to calibrate the tester scale the diameters of a number of glass filaments are first determined by means of a microscope equipped with an eyepiece micrometer. Each filament is bent into a V shape and cut to a convenient length. These filaments of known diameter are then placed between the contact surfaces of the tester with the detector needle rising between the two segments of filament, and the scale reading noted. Plotting the diameters of the filament against the scale reading, a straight line is obtained, from which the scale factor of 0.0039 mm. (0.000154 inch) per division is obtained.

The scale factor can be verified by determining the optical and mechanical magnification of the apparatus and using these to calculate the total magnification and the scale factor.

Standard apparatus conditions follow: the clamping pressure should be set at 352 grams per square centimeter (5.0 p.s.i.) and the detector needle load, with the 0.033 mm. (0.0013 inch) needle point at 0.05 gram, each determined by a static balancing test; the clamp opening should be set at the smallest clearance possible while still permitting the sample to slide freely between the contacts when advanced by the sample moving mechanism; the form of the detector needle must be checked occasionally by microscopical examination and corrected, if necessary, by grinding or replacement. The rise of the detector needle above the contact surface should be set to 0.0076 mm. (0.0003 inch).

Operating technique: The first step in making a test is to determine if the motion of the detector needle through the hole is normal and if the two contact pieces close properly. In order to get the correct zero setting of the scale, any dust must be first completely removed from the contacts . The most satisfactory method is merely to wipe the contacts using the finger tip dipped in benzene. The contact surfaces are then brought together by turning the crank and the scale reading is noted. This operation is repeated several times until a constant reading is obtained. Then with the contacts closed and the detector needle fully lowered, the zero mark on the scale is set so that it coincides with the top edge of the hairline image.

The sample clamp is brought fully to the right as shown in Fig. 2, B by turning the upper cyclometer wheel. The paper strip, about 1 by 15 cm. (0.5 by 6 inches), is first freed of dust by brushing lightly and rapidly with a camel's hair brush while blowing a stream of air against it. It is then inserted between the contacts and clamped at the end with the side to be tested turned upward.

The readings are taken by turning the crank and recording the position of the hairline image on the scale at the lowest point during each revolution. It is advisable to take about 500 readings on a sample. Readings above the zero point of the scale are designated as *plus* and those below as *minus*.

Calculation of results: The readings may be statistically treated in several ways to characterize the surface tested. The most complete characterization would be to group the readings into different magnitude groups and determine the number of individuals in each. A simple modification would be to record the number of readings exceeding a certain magnitude. The latter might be useful in connection with evaluating the tendency of the paper to make complete contact with another surface under pressure, as in printing.

If a single value is desired, the roughness may be calculated as the standard deviation of the readings—i.e. the roughness:

$$\sigma = \sqrt{\frac{\Sigma\ (\bar{x}-x)^2}{n}}$$

where x is the reading, $\bar{x}$ the mean reading, and n the number of readings.

Another calculation form was studied, defining the roughness d as the average of the readings disregarding algebraic sign. Unless specified, however, σ is the quantity meant when the term "roughness" is used hereinafter.

Method Variables

Atmospheric Conditions and Mechanical Disturbances

Among the chief factors influencing the test results is the interference due to dust particles which are frequently larger than the surface irregularities to be measured. It is necessary, therefore, to keep the detector needle, upper contact surface, and sample surface as nearly dust-free as possible to avoid error.

Dimensional changes of the apparatus due to temperature variation and mechanical disturbance due to vibration likewise must be anticipated and corrected.

Moisture content variations induced by humidity changes often affect the surface roughness of paper, especially soon after calendering or other surface treatment and must not be ascribed to the apparatus.

Clamping Pressure

The pressure with which the paper is clamped between the contact surfaces is a factor which influences

the test result and therefore must be standardized and controlled. The pressures recorded in Tables I and II are based on measurement under static conditions and actually are lower than the effective pressure at the instant of contact due to the pressure developed by impact.

It is easily seen that clamping pressure has an important effect, causing a decrease in the roughness, *d*; the magnitude of the decrease depends on the type of paper, the less dense and rougher ones showing a greater effect. If the roughness is expressed as σ, however, the decrease is much smaller on a percentage basis and less dependent on the type of paper tested — i.e, upon the magnitude of the roughness itself.

An increase in clamping pressure also causes an increase in the percentage of plus readings, as shown in Table II. These data show that the increase in clamping pressure causes the paper to be forced farther up into the hole in the upper contact surface. Consequently, it is clear that low clamping pressures must be employed to avoid distortion of the paper and, hence, errors in results. Evidently the pressure should not exceed 352 grams per square centimeter.

TABLE I.—THE EFFECT OF CLAMPING PRESSURE ON ROUGHNESS

Clamping pressure, g. per sq. cm.	Roughness, σ Scale divisions [1]			Roughness, d Scale divisions [1]		
	Blotting	News	E.F. book	Blotting	News	E.F. book
352	1.25	0.80	0.30	2.16	1.16	0.42
752	1.32	0.70	0.26	2.06	0.77	0.32
1180	1.20	0.70	0.29	1.63	0.60	0.28
1500	1.18	0.67	0.255	1.47	0.60	0.225

[1] One scale division = 0.0076 mm. at the time of these determinations.
The hole diameter = 0.482 mm.

TABLE II.—EFFECT OF CLAMPING PRESSURE ON THE PERCENTAGE OF PLUS READINGS

Clamping pressure, g. per sq. cm.	Percentage of plus readings		
	Blotting	News	E.F. book
352	0.8	4.0	2.2
752	1.8	12.4	3.6
1180	2.8	16.2	7.2
1500	8.5	21.4	16.2

Clamp Opening

The distance between the contact surfaces, when opened fully by the cam action, has an appreciable effect on the roughness value as shown in Table III. The general trend is for the roughness to decrease with increasing amount of opening. This is probably due to a greater impact or momentary clamping pressure which affects the test result similarly to the previously mentioned static clamping pressure. The paper evidently does not fully recover from the impact except in the case of the σ values on the book paper which show no definite effect.

Diameter of Detector Needle Hole

The principal effect of changing the size of the hole in the upper contact surface is to change the percentage of plus readings, a decrease in hole size causing a reduction in the percentage as shown by Table IV. The large percentage of plus readings with the 2.54 mm. hole must have been due to a bulging of the paper into the hole. Because the function of the upper contact surface is to maintain the paper in a flat condition and the function of the hole is to permit contact of the detector with as little interference with the flat condition as possible, it is desirable that the hole be as small as practicable. A 0.127 mm. hole was tried, but abandoned after erratic results were obtained. A 0.254 mm. hole, one tenth of the original size selected, was found satisfactory in this respect.

TABLE III.—EFFECT OF CLAMP OPENING ON ROUGHNESS

Clamp opening, mm.	Roughness, σ Scale divisions [1]		Roughness, d Scale divisions [1]	
	News	E.F. book	News	E.F. book
0.750	0.707	0.286	0.830	0.306
0.406	0.718	0.301	0.837	0.315
0.152	0.760	0.278	0.915	0.331

[1] Same apparatus conditions as in Table I.

TABLE IV.—EFFECT OF HOLE SIZE ON PERCENTAGE OF PLUS READINGS

Percentage of plus readings			
2.54 mm. diameter		0.482 mm. diameter	
Wire side	Felt side	Wire side	Felt side
51	42	1	5

Pressure on the Detector Needle

The pressure on the detector needle is an important variable of the test, because it is one of the chief factors determining the amount of penetration of the needle point into the paper. The penetration, of course, varies also with the speed of approach to the paper and the size of the needle point. Since papers themselves vary in regard to the amount of penetration exhibited, it is obvious that penetration must be reduced to a minimum to obtain comparable roughness values on various papers.

The effect of varying the load on a 0.0203-mm. needle point upon the roughness and percentage of plus readings is shown in Table V. As the load on the point increases, the values of the roughness *d* steadily increase. The values of σ, which are much more irregular, show some tendency in the same direction but much less change, in fact, no appreciable change at all in the case of the coated book paper. The percentage of plus readings shows a definite downward trend with increasing load on the needle point.

The trends of the roughness *d* and percentage of plus readings show clearly that the increase in point pressure causes appreciable penetration into the paper. The greater constancy of σ as compared to *d* shows that even with greater penetrations and, thus, larger readings, the dispersion of the readings about their mean value tends to increase much less than the reading itself. In other words, penetration may increase to a certain extent without affecting the roughness, σ. This is not true of the roughness as expressed by *d*. Under the conditions used it is obviously necessary to reduce the point load to about 0.05 gram or less to bring the penetration to a practically negligible amount, because an appreciable

TABLE V.—THE EFFECT OF NEEDLE POINT PRESSURE ON ROUGHNESS, PERCENTAGE OF PLUS READINGS, AND AVERAGE PLUS READING [1]

Load on point gram	Roughness, σ Scale divisions [2]				Roughness, d Scale divisions [2]			
	News	E.F. book	Supercalendered book	Coated book	News	E.F. book	Supercalendered book	Coated book
0.05	1.25	0.46	0.26	0.23	1.66	0.50	0.20	0.19
0.10	1.37	0.55	0.28	0.23	1.76	0.62	0.22	0.25
0.20	1.26	0.51	0.31	0.20	2.07	0.68	0.30	0.21
0.41	1.81	0.63	0.42	0.25	2.91	0.90	0.41	0.24
0.82	1.81	0.84	0.40	0.25	3.85	1.38	0.48	0.38
	Percentage of plus readings				Average plus readings			
0.05	5.0	11.0	22.6	19.8	0.24	0.21	0.14	0.16
0.10	6.8	6.0	23.8	14.8	0.35	0.16	0.16	0.15
0.20	1.6	3.2	9.8	8.8	0.24	0.20	0.13	0.14
0.41	0.6	2.0	4.8	8.3	0.20	0.12	0.13	0.12
0.82	0.0	0.0	0.2	0.1	0.22	0.11	0.11	0.12

[1] Detector needle diameter = 0.0203 mm.; hole diameter = 0.482 mm.
[2] One scale division = 0.0039 mm.

difference in the *d* Values is effected by going from 0.05 to 0.10 gram load.

Diameter of Detector Needle Point

Data taken with a somewhat larger diameter of detector needle point, 0.033 mm., then the 0.0203 mm. diameter used in the tests reported in table V, show much less penetration. Accordingly the larger needle point is considered preferable. The form of the needle point naturally is related to the effective diameter and must be kept constant.

Distance Between Uniformly-Spaced Readings

The data in Table VI show that the distance between readings is of little importance when the spacing is uniform and the total number of readings per sample is constant. One hundred fifty readings per sample were used.

TABLE VI.—EFFECT OF VARYING DISTANCE BETWEEN READINGS

Distance between readings [1] mm.	Roughness, σ Scale divisions [2]	Roughness, d Scale divisions [2]
Sample 1		
0.396	0.31	0.47
0.318	0.33	0.46
0.157	0.28	0.44
0.079	0.33	0.43
Sample 2		
0.398	0.48	0.64
0.318	0.49	0.68
0.157	0.44	0.67
0.079	0.42	0.55
0.038	0.44	0.58

[1] Obtained on earlier form of apparatus by turning graduated disk attached to the screw moving the sample.
[2] One scale division = 0.0076 mm. at the time of these determinations.
The hole diameter = 0.482 mm.

Number of Readings per Sample

Since the roughness value as calculated is a statistical type of value, its accuracy greatly depends upon the number of readings taken for its calculation. The number of readings required to obtain a given variability is naturally dependent on the uniformity of formation of the paper, which generally speaking, is related to surface irregularity.

For sake of approximation it may be assumed that the standard deviation of the roughness, σ will vary inversely as the square root of the number of readings. The degree of agreement between values calculated from 250 readings is shown for several papers in Table VII.

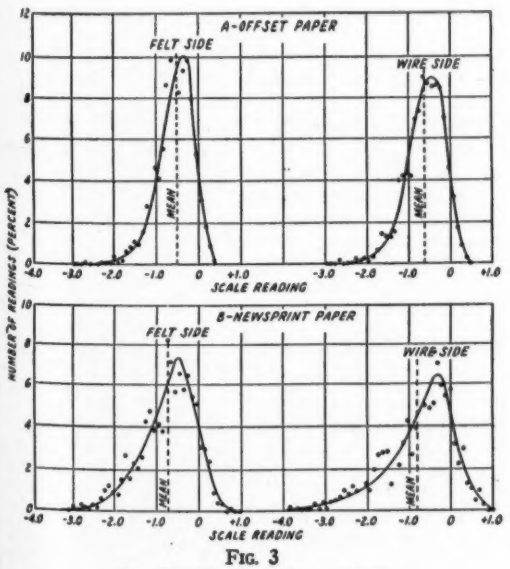

FIG. 3
Size Distribution of the Readings

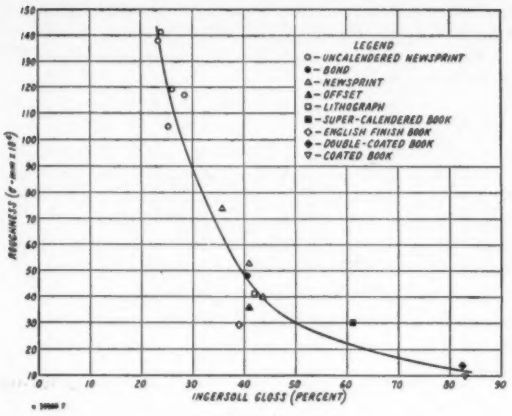

FIG. 4
Relation of Roughness to Ingersoll Gloss

The difference between the values obtained from each set of 250 readings was considered too great in some cases; however, since 500 readings gave a good degree of reproducibility it was considered satisfactory and adopted for use in subsequent measurements as shown in the last column of Table VII.

TABLE VII.—ROUGHNESS OF VARIOUS PAPERS AND INFLUENCE OF NUMBER OF TESTS

Description of sample	Roughness, σ Scale divisions [1] First 250	Second 250	All 500
E. F. book	0.360	0.320	0.345
M. F. book	0.520	0.630	0.585
Super, coated book	0.130	0.145	0.139
Super Roto	0.271	0.257	0.264
E. F. Roto	0.509	0.445	0.480
News	0.785	0.771	0.780
Label, super, coated	0.405	0.355	0.385
Super, coated	0.400	0.395	0.400
Antique book	1.460	....	....

[1] One scale division = 0.0039 mm.

Interpretation of Test Result

A series of readings taken under the optimum test conditions specified in the foregoing, represents the position, at 0.0787 mm. intervals of the profile of the essentially stress-free, undistorted paper. The roughness, σ represents a statistical measure of the deviation of this profile, at these points, from the average line drawn through it. On the assumption that these deviations are normally distributed about their mean, σ would represent the range into which about two thirds of the deviations fall.

The σ value has the advantage of being independent of a constant error in the readings, if such should occur, such as an error in the zero setting of the scale. Within certain limits it is, thus, independent of needle point penetration.

The *d* value is a statistical measure of the deviation of the profile from a reference line established by contact of the paper surface against a mechanically fixed plane. It is not as conventional and does not appear to be as dependably precise as σ for expressing roughness; however, it may be more useful since it is more sensitive, much more quickly calculated, and is simpler in meaning.

Size Distribution of the Reading

Figure 3 shows the size distribution of readings on an offset and a newsprint paper. These curves show

how the readings on the apparatus can be used to characterize a surface more completely than is possible with a single value, such as the calculated roughness value.

Figure 4 shows a curve obtained by plotting the percentage gloss values, obtained with the Ingersoll glarimeter, against the roughness, σ[4]. It is interesting to note that although there is an approximate relationship certain papers deviate markedly from the trend. The supercalendered book paper (Sample 14) has a higher gloss and the English finish book paper (Sample 16) a lower gloss than would be predicted by the curve. These deviations show the inadequacy of the gloss measurement to evaluate roughness.

Typical Results

Roughness values on samples of various printing papers are found in Table VII, showing the range of roughness, σ that would usually be encountered in such papers.

Table VIII shows the roughness values of a group of coated papers. Gloss values are given to assist in comparing roughness with this more familiar value.

It is interesting to note that the roughness values may be essentially the same while the gloss values are appreciably different. For example in the case of Samples D and E, one side has almost the same roughness as the other, but the gloss is substantially different.

Conclusions

1. The apparatus developed provides direct scale readings of the individual irregularities of a paper surface from which the roughness of the test surface may be calculated and the size distribution may be determined.

2. The apparatus permits the paper to be tested in a relatively stress-free condition, the feeler point motion being controlled so that side stresses are eliminated and penetration minimized.

3. The standard deviation of the readings is less influenced by the error of measurement than the arithmetic average. The latter, however, has certain advantages and may be satisfactory for ordinary commercial testing.

4. The apparatus requires further refinement for routine testing but is suitable in its present form for research on paper surface problems.

[4] Although the data are based on tests made when the method was in an earlier stage of development they are sufficiently accurate to show the type of relation to be expected with the present apparatus.

TABLE VIII.—COMPARISON OF ROUGHNESS OF VARIOUS COATED PAPERS WITH GLOSS VALUES

Sample	Roughness, σ Scale divisions [1]		Gloss, %	
	Side 1	Side 2	Side 1	Side 2
A	0.50	...	70.5	...
C	0.43	0.37	81.9	81.7
D	0.37	0.36	76.6	84.6
E	0.49	0.48	71.9	78.8

[1] One scale division = 0.0039 mm. Roughness based on 500 readings.

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Use of Bleachability Tests in the Marketing of Pulp*

By Rex Vincent[1]

Abstract

There are tests used to determine many of the characteristics of pulp which include bleachability, copper number, lignin, alpha and pentosan contents, and noncellulosic impurities in addition to physical tests of burst, fold, tear, freeness, etc.

Advances in technical development and knowledge have resulted in procedures of testing and definite meaning of terms previously used so that comparison of pulps from different mills may be made before entering the papermaking phase.

The growth of technical knowledge and its uses generally follows a broad pattern. There is first the accidental or searched-for discovery which is followed by a period of slow development or refinement until someone puts it to practical application. It then spreads through various phases until it becomes commonplace. Today, physical tests of pulp are commonplace in that they are widely used, the nomenclature is well established, and everyone expects that pulp will be tested before it is used. The tests themselves, aside from grading and evaluating pulp, have brought much information to light simply through the data and familiarity arising from them. They have broadened out until today instead of simply burst, tear, and freeness, there is classification by screens, fold tests, age tests for durability of physical strengths, hydration determinations, and many others. All these have piled up a wealth of information and one item in that pile is that physical tests alone are not sufficient to evaluate pulps. Too often pulps have turned up with identical physical characteristics but with subtle differences that become apparent when they are converted into paper. Chemical tests have been applied and, with the impetus afforded by the rayon industry, are gaining in acceptance and use.

There are many chemical tests that can be applied to wood pulp for the determination of its characteristics. We have sufficient procedures to analyze

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[1] Member TAPPI; Bulkley, Dunton Pulp Co., Chicago, Ill.

almost completely any particular type. These tests include bleachability by several procedures, copper number, alpha content, pentosan content, lignin, noncellulosic impurities, and many empirical procedures confined to one or two plants. These narrow down to several when their use is restricted to pulp for the manufacture of paper. The only chemical tests commonly in use for grading purchased pulp today are those for bleachability and copper number and the former far outranks the latter. This determination of chemical characteristics, outside of mills producing pulp, is fairly recent, having been in practice only on the buying and grading end for about 8 to 10 years. Prior to that time, pulp quality was determined entirely by physical tests such as burst, tear, fold, and freeness. Even this was not general as many small mills did not possess the necessary laboratory equipment and others were convinced that the information forthcoming from the laboratory was not of any value. Pulp was purchased by the buyer principally on the reputation of the mill that produced it and as it became known to him through actual conversion into paper. The seller of the pulp was required to know which pulps each and every mill considered the best for their own use and it was found that not many mills making the same kind of paper agreed on the pulp to be used. As technical knowledge increased in the production of wood pulp, it began to creep downward into the consuming end and buyers were presented with several different qualities from the same mill where previously they were faced with only one. Competition also made it necessary to secure the cheapest pulp that would satisfactorily fill the bill. These factors made laboratory information most valuable because it enabled the buyer to pick and choose among the many different brands and qualities offered to him.

Technical information, accumulated over several years, made it obvious that pulp quality was of a very fluid nature and subject to constant change and improvement. The pulp from any one mill would undergo changes from year to year as the mill made improvements, installed new equipment or began working new sections of timber. Along with these ordinary changes the domestic pulp industry began to operate to such an extent that its tonnage became significant in the American market, and, with this source, the development of technical information on a uniform basis was made much easier. During this period, and because of the easy movement of American pulps, attempts were made to peg what had been previously general names with reference to pulp quantities.

Bleachability

Pulps had been classified as strong, prime strong, prime special, second quality, or easy bleaching with all sorts of number and letter combinations to designate a particular group of characteristics. The words "prime" and "strong" meant the best grade of pulp that any particular mill made and had no meaning at all in comparison with the prime or strong pulps from another mill. A prime strong pulp from Mill A might not be at all comparable to the prime strong pulp from Mill B. Nevertheless, both of them bore the same name and the tendency was to place them in the same category. They might be differentiated a little further in some cases by saying that one was a soft pulp and the other was hard. This was confusing in that the word "hard" did not necessarily mean that the pulp was hard itself, in the usual meaning of the word, or that it produced hard papers or that it was hard to beat off, it meant different things to different people and one had to guess what any particular buyer might mean by the word hard. The same thing applied to "soft." The first means to give these words a definite meaning was the measurement of oxidizable materials in the unbleached pulp by determining directly the amount of chlorine absorbed, known as the Roe method. This was a rather complex and lengthy method as it depended on the actual absorption of chlorine by the pulp at a controlled moisture content and temperature. However, it was used quite widely by the producing mills in Sweden for grading their pulps as they came off the end of the drying machine and one mill producing kraft pulp, graded a range from a Roe number of 7 down to a Roe number of 3. They added a zero to this number and spoke of qualities 50, 60, 30, etc. This was such an advancement in the means of designating and discussing the hardness of pulp, which by this method was automatically confined to the rawness or degree of cooking, that consuming mills tried to adapt the process for their own use. This resulted, through efforts to simplify the procedure and adapt it to the ordinary paper mill laboratory, in the acceptance of the Wiles permanganate number procedure which measured the oxidizable substances by the use of potassium permanganate.

There were any number of methods used in between and so far as can be learned, are still used. However, now we find that most American mills, both producing and consuming, are using the permanganate procedure (*see* TAPPI Standard T 214 m) because of its speed, simplicity, and reasonable accuracy. The result is converted into the chlorine demand, the chlorine number, or the bleachability expressed in bleach powder. The confusion today rests almost wholly in the manner in which the permanganate number is finally expressed as indicated above. Some mills who are bleaching pulp for convenience sake express it in percentage chlorine demand and talk about pulp from that basis. Others simply maintain the permanganate number as such without converting it to any corresponding chlorine figure. Still others convert it to the bleach powder basis and speak of it as percentage bleachability. We have found that the latter is the most easily understood by buyers and executives in paper mills and by the consistent use of it there has grown up a language which has to a large extent removed the old haziness surrounding the words hard, soft, and strong.

Today, in discussing any pulp or any particular quality of a pulp, the words hard, soft, and strong are still used but they are confined and limited by various descriptions of their bleachability. Right along with these words, other adjectives such as "easy bleaching" and "bleachable" have come into use and growing up with this has come a classification of use requirements largely by the percentage bleachability. For example, strong domestic pulps will have bleachabilities ranging from 20 down to 17, the bleachable grade will run from 17 down to 14, and the easy bleaching from 14 as low as 10. It should be mentioned here that these bleachabilities refer strictly to American west coast pulp. Scandinavian pulps in the same classifications, that is, strong, bleachable, and easy bleaching will run considerably higher in percentage bleachability. It is

not uncommon to have Scandinavian pulps in the bleachable range with bleachabilities as high as 22 to 25.

Use Requirements of Pulp

In discussing the use requirements of the pulp, there is taken into consideration whether it is to be used as a straight unbleached or whether it is to be bleached in the paper mill. If the pulp is to be used as a straight unbleached, the bleachability is used as a guide for strength and resistance to beating. We have learned that a pulp with a bleachability of about 17 will have greater strengths than one of 14 and will take on water of hydration faster. If the mill is not equipped to beat the pulp properly and to get out of it the potential strength that is there, they must sacrifice some part of the potential strength and move down to a bleachability in the neighborhood of 15. This middle range—i.e., around 15—has been found to be the one quality which will satisfy the broadest range of requirements. This pulp can be used in book paper, paperboards, or a wide range of specialties. In certain grades of groundwood papers where the fiber must be kept as free as possible, it is necessary to go as low in bleachability as 10 or 11. Here it is desired to keep the fiber as free as possible while at the same time softening and wetting it so that it will form smoothly and flatly into a sheet. The lower bleachabilities indicate a more purified fiber which will not take on water as rapidly as those in the higher ranges. Conversely, where a large amount of hydration is required, as in greaseproof and glassines, it is necessary to go as high as 19 or higher. Incidentally, one of the latest improvements in the west coast pulps has been the production of an unbleached sulphite which has a bleachability of 19 and is relatively free from shives. Thus, we find that on the low end and high end of the scales, the pulp is restricted to rather special uses and that in the middle range, from 14 to 17, it can go into any number of papers. If the pulp is to be bleached in the paper mill, a new set of requirements must be considered, the foremost of these being the amount of chlorine required to get a good commercial white. Most mills are satisfied if this figure is in the neighborhood of 5% chlorine and this figures into a bleachability percentage of about 15.5. This again falls into the middle range which was mentioned above.

Now, it is quite possible to have two pulps of the same bleachability but with different strength characteristics. This might be due to the wood or some change in acid concentration or cooking cycle. This is no deterrent to the scheme of using bleachability but is really an adjunct, for if the two pulps have the same bleachability but different strengths it is one further means of differentiating between them. One thing will be known about them and that is that they both have received the same degree of purification and they will respond to treatment at about the same rate; the difference being that one will develop a little greater strength on the same treatment than will the other. At the pulp mill, strength tests as well as bleachability tests are made and pulp is picked on the basis of both tests. When one mill is shipping pulp to 100 or 120 different customers and is forced to maintain a standard of uniformity in each of the customers' mills it is absolutely necessary to have both the strength tests and the bleachability test.

Degradation and Bleachability

The foregoing refers wholly to unbleached and recently we have noticed a tendency to use a test on bleached sulphite to accomplish the same ends. This test is the copper number which, instead of measuring the oxidizable materials in the pulp, measures the reducing materials. While the bleachability tests measure, to a certain extent, purification, the copper number measures degradation since it reflects the amount of oxycellulose formed during the bleaching process. Information available concerning the relationship between the copper number of a pulp and its other characteristics is lacking to a large extent and is being developed currently. I do not mean to infer that the copper number is being widely used on bleached sulphites in the way that bleachability tests are used on unbleached sulphites. In the past four years, I can recall only three instances where the copper number was used at all. In one case, a mill making rag-content papers wanted a bleached sulphite that would resist beating to such an extent that it could be furnished to the beater at the same time that the rag stock was furnished. In this instance, we found that a lower copper number indicated a harder beating pulp and by lowering the copper number from 2 to 1.7, the desired result was obtained. In the two other instances, the copper number desired from the pulp was low because both mills felt that it was an indication of the permanency of the pulp and that a lower copper number would indicate a pulp which would preserve its original qualities better over a period of years. Information concerning the relationship between copper number and other characteristics of various pulps should be investigated, but, before this is done, there should be a further standardization on the procedure as we have found it difficult to check the comparison from one mill to another and in order to get any place, it is necessary for both mills to test all samples of pulps under consideration.

Effect of the Pentosans

For further work along these lines, I would like to recommend investigation into the influence of pentosan content on pulps and how to maintain the pentosans in the pulp during the cooking. Enough information has been developed on this subject to be interesting—e.g., the addition of as little as 2% of synthetic pentosans will completely change the beating characteristics of a pulp. No matter what you may have with reference to strength tests and bleachability, if the pentosan content should change, the other tests are meaningless.

We have found through experience and rule of thumb that the higher the pentosan content the more satisfactory are results obtained in the production of glassines, greaseproofs and other highly beaten papers. We have learned enough to feel that one of the major differences between the American pulps from the west coast and the Scandinavian pulps is in their pentosan contents and that the major difference between the old fashioned Mitscherlich cooked pulp and the modern indirect cooked pulp is the pentosan content. This is probably the reason these pulps in the same classes will run to higher bleachabilities than the west coast product.

Imports of Paper and Paper Making Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard; Bleached Sulphite More Acute—Some Grades of Old Waste Lower.

Effective September 30, 1939, under Treasury Decision 49,970, all publications, exchanges and trade associations were denied access to import manifests at the New York Customs House. The Paper Trade Journal and other interested parties have vigorously protested this ruling, and as soon as the order of the Treasury Department is modified or rescinded, full publication of all manifests will be resumed in these columns. In the interim, the Paper Trade Journal is making every possible effort to gather all available information from manifests, at various outside sources.

NEW YORK IMPORTS

WEEK ENDING OCTOBER 4, 1941

SUMMARY

Cigarette paper .....358 cs.
Newsprint .....9,454 rolls
Miscellaneous paper .....75 cs.

CIGARETTE PAPER

Garcia & Diaz, ———, Alicante, 20 cs.
———, ———, Barcelona, 37 cs.
Kuenzle & Streiff, Inc., ———, Fort de France, 30 cs.
P. J. Schweitzer, ———, Fort de France, 133 cs.
Standard Products Corp., ———, Fort de France, 69 cs.
———, ———, Fort de France, 69 cs.

NEWSPRINT

International Paper Co., ———, Gatineau, 330 rolls.
H. G. Craig Co., Inc., ———, Donnacona, 316 rolls.
International Paper Co., ———, Gatineau, 331 rolls.
H. G. Craig Co., Inc., ———, Donnacona, 369 rolls.
———, ———, Cornerbrook, 7,718 rolls.
H. G. Craig Co., Inc., ———, Donnacona, 390 rolls.

MISCELLANEOUS PAPER

P. J. Schweitzer, ———, Fort de France, 75 cs.

RAGS, BAGGINGS, ETC.

W. Intner & Co., ———, Bombay, 1,440 bls. cotton waste.
O'Brien Products, ———, Bombay, 1,050 bls. cotton waste.
New England Waste Co., ———, Bombay, 300 bls. cotton waste.
Philadelphia National Bank, ———, Santos, 102 bls. cotton linters.
———, ———, Santos, 1,748 bls. cotton linters.
The Heyman Co., Inc., ———, Buenos Aires, 1,269 bls. cotton linters.
W. R. Grace & Co., ———, Callao, 61 bls. cotton linters.
Philadelphia National Bank, ———, Callao, 86 bls. cotton waste.
———, ———, Point a Pitre, 431 bls. rags.
———, ———, Rio de Janeiro, 407 bls. cotton linters.
S. Godfrey, ———, Buenos Aires, 40 bls. rags.
Castle & Overton, Inc., ———, Buenos Aires, 12 bls. old garments, 7 bls. new clippings, 6 bls. thread waste.

GLUESTOCK

Darmstadt Scott & Courtney, ———, Buenos Aires, 57 bls.
Manufacturers Trust Co., ———, Buenos Aires, 159 bls. (dry).
H. Remis & Co., ———, Rio de Janeiro, 345 bls.

WOOD PULP

Halifax Power & Pulp Co., ———, Sheet Harbor, 901 bls. (ground).

Southern California Papermakers Meet

On October 2, seventy Papermakers and Associates of Southern California and guests met at Scully's Cafe, Los Angeles, Calif., for their fourth dinner meeting. Chairman H. L. Joachim opened the meeting immediately after dinner and announced that ten new members had been admitted, bringing the total membership of the organization to eighty.

Harlan Scott, editor of the *Pacific Pulp and Paper Industry*, spoke briefly on the value of organizations such as P. A. S. C. and also mentioned that present day emphasis in the industry was on better engineering.

The first scheduled speaker of the evening was C. S. Jamison, consultant, Priorities Division, O. P. M. Although no full treatment of Mr. Jamison's subject "Priorities" could be expected in the time available for the talk, he did manage to clearly present some of the reasons for priorities, the workings of the Priorities Division, define classifications and describe the various applications. In the question and answer period that followed the interest of the audience in the subject was evidenced by the number of questions asked.

Walter Burroughs, of Pisma Products, then gave a lecture on printing, describing the three broad classes of printing—typography, planograph and intaglio and pointing out the limitations, advantages and paper requirements of each class.

George Ford, rounded out the program with his talk on "Printing of Paperboard", covering the printing of boxes and cartons.

After announcing "Stock Preparation" to be the chief subject of the next meeting under Dick Buckley's direction and to be held on December 11th, Chairman Joachim adjourned the meeting.

Those present were: Floyd Adams, Taylor Alexander, Willard Axtell, Robert Baum, Arnold Beckman, Wm. Belleman, Wm. Birdsey, George Boeck, Bruce Brown, Jr., Bruce Brown, Sr., Richard Buckley, Walter Burroughs, Max Campbell, E. F. Champion, Robert Clarke, Albert Clerx, V. Cole, Robert Cooper, Roy Culp, Geo. Cunningham, Frank Dilley, E. Eilersgaard, Grant Farmer, Thom. Fletcher, George Ford, Chas. Frampton, J. W. Genuit, J. E. Hartford, Clarence Hazelton, J. M. Henshaw, C. R. Jamison, J. W. Jamison, H. L. Joachim, Jack Johns, Wm. King, Wm. Kinney, Harry Lilburn, H. S. Lund, Francis Mark, Parke Math, Geo. McCord, R. L. Mitchell, Sid. Newsom, E. J. Nugent, Stanley Parker, Arthur Paterson, Dan Phillips, Glen Phillips, Lloyd Ramsey, Tom Rhodes, Gene Ridings, Foster Rucker, Otto Sass, Walter Schulken, Archie Schwartz, Harlan Scott, Wesley Scott, Ralph Shadwell, John Stanko, F. J. Stephens, Sam Stevenson, Ernst Swanberg, J. Tillman, W. Tillotson, Elmer Tolliver, John Van Ounsem, Robert Vignolo, Frank Wheelock, Bill Williamson, Harold Willoughby and John Zippi.

New York Paper and Pulp Market Review

Paper Market Reported Active With Mill Orders Substantially Higher Than Shipments—Pulp Market Strong With Demand Well In Excess of Supply—Paper Stock Market Less Active This Week.

Office of the PAPER TRADE JOURNAL,
Wednesday, October 8, 1941.

Demand for most grades of paper and paper products continues to reflect the high level of general business activity. The paper supply situation continues as a major topic of discussion in the wholesale market but much of the confusion which has prevailed relating to the future supply is subsiding. Reports from many manufacturers' representatives, jobbers, and general paper merchants during the week indicate a heavy demand for paper, firm prices and continued uncertainity of the future course of business.

The index of general business activity for the week ended September 27 declined to 128.2, from 128.3 for the preceding week, compared with 111.7% for the corresponding week last yar. Paper board production declined 3.8%.

Paper production for the week ended September 27 was estimated at 105.2%, compared with 86.7% for 1940, with 96.1% for 1939, with 78.4% for 1938, and with 81.9% for the corresponding week for 1937.

Paper board production for the week ended September 27 was 98.0%, compared with 78.0% for 1940, with 82.0% for 1939, with 68.0% for 1938, and with 70.0% for the corresponding week for 1937.

Reports continue to indicate that while the curve in the trend of paper orders is less sharply upward, orders are at so high a level that the current full capacity poduction cannot satisfy the demand. So far as actual needs are concerned, there are no authoritative reports of consumers unable to purchase the paper actually required. The question has been raised: if mills were able to produce all the paper to meet this abnormally heavy demand, would the concerns ordering it really want it if they could get it? In other words, a scarcity psychology has been created, according to one viewpoint, and when a product is in great demand buyers are inclined to place orders substantially in excess of their actual needs, through fear of inability to get enough to meet everyday requirements.

Prices are firm on all grades of paper and paper products at this date, with only small advances expected later on.

Chemical Pulp

The chemical pulp market is strong and prices firm with the strong pressure of demand exerted on prices. Demand for all grades of pulp is well in excess of supply. Current prices reflect an upward trend. Prime bleached sulphite is currently quoted on contract at from 3.72½ to 4.75; the news grade of unbleached sulphite at from 63.50 to 67.75 per ton, and domestic and Canadian kraft at from 3.00 to 3.50.

Rags

New cotton cuttings, which displayed more firmness last week under improved mill buying, are firmer as demand continues moderate to active in this and comparable grades.

Roofing rags are also firmer, with prices well maintained at this date.

Old Rope and Bagging

Trading in old rope is reported active this week on the old No. 1 and No. 2 Manila grades. A good demand is also reported on jute and sisal strings. Prices are firmly maintained.

Demand for scrap gunny is moderate at this date. Prices are firm and unchanged.

Old Waste Paper

Activity in the old waste paper market has declined since the OPA maximum prices went into effect on October 1. Moderate buying is reported at this date at the ceiling prices directed by the government agency.

Twine

A good demand for most grades of twine is reported at this date. Prices are firm and well maintained under the influence of the high level of general business activity. No important price change on hard or soft fiber twines has been reported this week.

Want to Save Malone Plant

MALONE, N. Y., October 6, 1941—The local Chamber of Commerce has started a movement to forestall the razing of the Malone Paper Mill which several years ago housed the principal industry of the city. The property was recently purchased by Abe Cooper, head of the Bagley & Sewall Company, who has sold and removed all the papermaking equipment in the plant. It is understood that he now plans to demolish the building in order to save taxes. A delegation from the Chamber of Commerce and the village trustees recently inspected the property and an effort is to be made to secure a tenant. Announcement is made that the buildings can be purchased for $10,000, this representing the salvage value. When the mill was in its prime the owners are said to have refused an offer of $75,000 for the mill. The main mill building contains more than 12,000 square feet of floor space while other structures make the total space available between 50,000 and 60,000 square feet.

To Open Bids November 24

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 8, 1941—Joint Congressional Committee on Printing will open bids on November 24 for paper for the use of the Government Printing Office for the six months period beginning January 1, next. The committee will meet on December 1 to make awards.

The Paper Specification Committee of the Joint Committee held an initial meeting last week and several more will be held for possible specification changes. Due to the present emergency it is probable that some changes will be made before the specifications are available. Ansel Wold, clerk of the Joint Committee, is chairman of the Specifications Committee.

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503 Market St.
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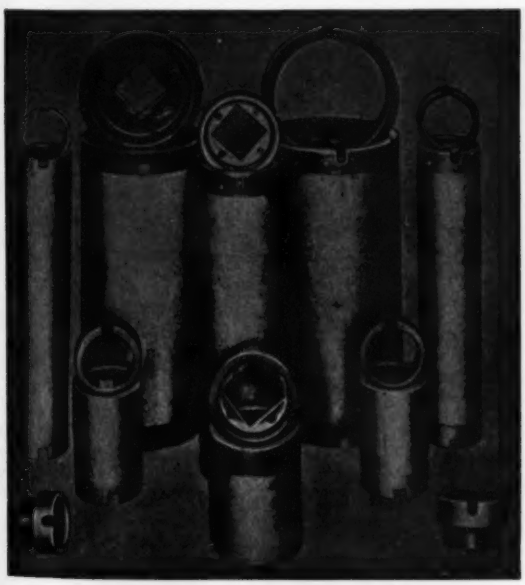
Coolidge Chip Packer
Rosenblad Blowsteam Plant
F.M.P. Coarse Screen & Knotter
Thune Pressure Filter
Norman Chip Duster
Drammen Blow Valve
Sandberg Diffuser Valve



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Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

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Samples of caps or cores will be gladly submitted

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CORINTH, N. Y.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 8, 1941.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton, f.o.b., works. Demand reported good for the week.

BLEACHING POWDER — Quotations on bleaching powder are firm. Demand reported good for the week. Bleaching powder is currently quoted at $2 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are firm, under a good demand for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at 28 cents per pound; 80-100 mesh, at 28½ cents per pound. All prices in bags, car lots. Argentina casein, 20-30 mesh, is currently offered at 28 cents per pound. No quotations on French casein.

CAUSTIC SODA—Quotations on caustic soda are firm and continue unchanged at prevailing market prices. Demand reported good. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, car lots, at works.

CHINA CLAY—Prices on china clay are firm and conform to prevailing market levels. Demand reported moderate at this date. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay at from $12 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Government demand heavier. Market under mandatory priority ruling. Chlorine is currently quoted at $2 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with prices lower on some grades. "G" gum rosin is currently quoted at $2.43 per 100 pounds, in barrels. Savannah "FF" wood rosin is currently quoted at $2.42 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at $2.94 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm and nominal. Demand active. Domestic salt cake is currently quoted at $15 per ton, in bulk; chrome cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $16 per ton imported salt cake is nominal.

SODA ASH — Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported active for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are firm and are reported unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported good for the current week. The commercial grades are currently quoted at $1.15; iron free at $1.85 per 100 pounds. All prices in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. No quotations on imported talc.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.25	@$6.00	
Superstandard	4.87½	"	5.25
Northern Standard Wrapping	4.50	"	5.00
Standard Wrapping	4.50	"	—
Tissues—Per Ream—Carlots			
White No. 1	1.07½	"	—
White No. 1 M. G.	.97½	"	—
White No. 1½	.85	"	—
White No. 2	.85	"	—
Anti-Tarnish M. G.	.90	"	—
Colored	1.00	"	—
Kraft	.90	"	—
Manila	.80	"	—
Unbl. Toilet, 1 M.	4.14	"	—
Bleached Toilet	5.60	"	—
Paper Towels, Per Case			
Unbleached, Jr.	3.80	"	—
Bleached, Jr.	2.30	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	8.75	@	10.75
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	48.00	@	—
Chip	48.00	"	—
Sgl. Mia. Ll. Chip	60.00	"	—
White Pat. Coated	75.00	"	—
Kraft Liners	60.00	"	—
Binders Boards	80.00	"	—

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$40.25	@$47.25	$41.40	@$48.50
100% Rag	32.20	" 37.75	33.35	" 39.25
85% Rag	....	"	32.20	" 37.75
75% Rag	24.75	" 29.00	25.90	" 30.50
65% Rag	....	"	22.80	" 27.75
50% Rag	18.70	" 22.75	19.90	" 24.25
25% Rag	16.40	" 20.00	17.55	" 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55	@$12.75	$11.70	@$14.25
No. 2	9.65	" 11.75	10.80	" 13.25
No. 3	9.20	" 11.25	10.35	" 12.50
No. 4	8.90	" 10.75	10.05	" 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.05	@$14.75	
No. 2 Glossy Coated	11.80	"	13.50
No. 3 Glossy Coated	11.00	"	12.50
No. 4 Glossy Coated	10.60	"	12.00
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.50	"	9.75
C Grade S. & S. C.	8.75	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	No prices		
Dry	No prices		
(Delivered)			
No. 1 Domestic and Canadian	40.00	@	42.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.72½	@	4.75
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	4.25
Strong Unbleached Sulphite	3.17½	"	4.25
News Grade, delivered			
Unbleached Sulphite	63.50	"	67.75
(On Dock, Atlantic Ports)			
Kraft Bleached	4.12½	"	—
Kraft Light & Strong	No price		
Kraft No. 1	3.60	"	4.75
(F. o. b. Pulp Mill)			
Kraft Domestic and Canadian	3.00	"	3.50
(Delivered)			
Soda Bleached	3.30	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	8.00	@	8.25
Silesias No. 1	4.50	"	4.75
New Unbleached	7.75	"	8.00
Blue Overall	5.00	"	5.25
Fancy	2.75	"	3.00
Washables	2.00	"	2.13
Mixed Khaki Cuttings	2.50	"	2.75
O. D. Khaki Cuttings	3.00	"	3.13

Old Rags

White, No. 1—			
Repacked	3.10	"	3.31
Miscellaneous	2.35	"	2.60
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	1.25	"	1.35
Miscellaneous	1.10	"	1.25
Roofing Rags—			
No. 1	1.50	"	1.60
No. 2	1.35	"	1.50
No. 3 (bagging)	.95	"	1.00
No. 4	.90	"	.95
No. 5A	.90	"	.95

Foreign Rags

All prices nominal.

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.10
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

You will save valuable time and gain helpful knowledge.

THIS YEAR is putting technical management to the test. The Chemical Industries—all industries depending on applications of chemistry—more than ever before, need quick, efficient and intensely practical pooling of brains. Every authoritative means of interchanging knowledge has become of momentous importance, making this year's Exposition of Chemical Industries not only timely, but literally essential to National Defense.

THIS EXPOSITION, by bringing together leading manufacturers and thousands of those whom they can serve, will help to solve problems, relieve bottlenecks and speed production. Visit this year's Chemical Industries Exposition, see and learn about newest developments, discuss your problems with experts. Nowhere else can you find so much helpful information as readily, as promptly and as profitably as at this Exposition.

NEVER BEFORE has the Chemical Exposition been of greater importance. Not in years have so many manufacturers serving the chemical industries arranged to be on hand to help answer the production and procurement worries faced by industry everywhere. Here, in one week or less, you can witness scores of demonstrations; consult specialists present at exhibits solely to help visitors; see with your own eyes what is available in new materials, equipment, appliances, instruments and supplies; examine, compare, and find what you need.

It is long since exhibitors, themselves as busy and as eager to serve as you are, have made as great effort to contribute to Industry's needs. By the very fact that these manufacturers are taking time out to exhibit in this busy era, they set themselves apart as a group particularly worth meeting. Isn't that the kind of manufacturer with whom you'd like to do business? See what these exhibitors offer.

The years following the 1941 Exposition will be a critical period in the lives of all who promote production for defense. The wealth of ideas and information made available here will help materially to our progress through the present emergency. This year, attendance is a "must". Don't miss it. Be sure to come—bring your associates.

18th EXPOSITION OF CHEMICAL INDUSTRIES

GRAND CENTRAL PALACE, NEW YORK, DEC. 1-6, 1941

Managed by International Exposition Co.

DEDICATED TO SPEEDING UP AMERICA'S INDUSTRY FOR THE DEFENSE PROGRAM

568

★ ★

An Idea

60 YEARS AHEAD OF ITS TIME

TODAY, we are hearing a great deal about American self-sufficiency in chemicals.

It is easy to think of this as an idea that is new and different.

As a matter of fact, this concept was the driving force behind the start of a great chemical development fully 60 years ago.

Rowland Hazard and William Cogswell talked of American chemical self-sufficiency in 1881 and with this thought in mind founded The Solvay Process Company.

Because of the foresight of these men, America is today independent in the matter of Alkalies, and because of that fact, enjoys a large measure of chemical self-sufficiency.

At no other period in American history has chemical self-sufficiency been of greater importance than it is at the present time. And yet, there is even more to the story of chemical progress than our national security.

This is the age of research development on many fronts . . . of an endless procession of new things . . . plastics, fabrics, fuels, metals, new types of glass, which are coming from the laboratories.

This is THE NEW WORLD OF CHEMISTRY in which Alkalies are of major importance. It is the world of new materials which took a long stride forward 60 years ago when the foundations of The Solvay Process Company were laid down.

Now, as increasing quantities of pure grades and new forms of alkalies become more important than ever before, it is highly important to check sources of supply for reliability and capacity to meet all contingencies.

The present situation serves only to emphasize the advantages of buying your alkalies from Solvay.

1881 1941

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 Rector Street • New York, N. Y.

★

SOLVAY ALKALIES FOR PULP AND PAPER MAKING

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.08	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.50	@	4.75
Wool Tares, light....	2.50	"	2.75
Wool Tares, heavy..	2.50	"	2.75
Bright Bagging.....	4.25	"	4.50
Manila Rope—			
Foreign	6.00	"	6.25
Domestic	6.00	"	6.25
Jute Threads.....	4.00	"	4.25
Sisal Strings.....	2.75	"	3.00
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.75	@	4.00
Ordinary Hard White No. 1....	3.25	"	3.50
Soft White No. 1..	2.50	"	2.75
Sott White Extra..	2.70	"	2.85
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag....	1.25	"	1.40
Solid Flat Book....	1.15	"	1.30
Crumbled No. 1 ..	.70	"	.75
Ledger White Stock.	2.30	"	2.45
Ledger Stock Colored	1.75	"	1.90
Manila—			
New Env. Cut....	3.25	"	3.50
New Cuttings.....	3.00	"	3.25
Old Kraft Machine Compressed bales..	2.00	"	2.10
News—			
No. 1 White News	1.50	"	1.60
Strictly Overissue.	.75	"	.80
Strictly Folded....	.65	"	.75
Corrugated	.82½	"	.90
No. 1 Mixed Paper..	.57½	"	.65

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp.....	.21	"	—
Fine Polished—			
Fine India.....	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers.....	.17	"	—
Tube Rope.....	.19	"	—
Wall Paper.....	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope...	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java.....	.18	"	—
Mex. Sisal.....	.16	"	—
Manila	.26	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1.	.07¼	@	.07½
New White No. 2.	.04½	"	.05
Light Silesias.. ..	.04½	"	.04¾
Silesias, No. 1....	.04	"	.04¼
Black Silesias, soft	.03½	"	.03½
New Unbleached..	.07¼	"	.07½
Washable Prints...	.03¾	"	.03½
Washable No. 1..	.02	"	.02¼
Blue Overall.....	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales....	.03¾	"	.03½
New Black Soft...	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.....	.03	"	.03¼
No. 2 Mixed.....	.02½	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas.....	.04¾	"	.05¼
New Black Mixed.	—	"	.02½

Domestic Rags (Old)

White No. 1—			
Repacked	3.25	@	3.75
Miscellaneous	3.00	"	3.25
Thirds and Blues—			
Miscellaneous	1.75	"	2.00
Repacked	2.00	"	2.25
Black Stockings (Export)	Nominal		
Roofing Stock—			
Foreign No. 1....	Nominal		
Domestic No. 1...	1.80	"	1.90
Domestic No. 2...	1.65	"	1.75
Roofing Bagging..	1.55	"	1.65

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	3.50	@	4.25
Domestic	3.75	"	4.00
Manila Rope....	—	"	5.50
Sisal Rope.....	3.75	"	—
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	3.75	"	4.00
No. 2.....	1.55	"	1.65
Wool Tares, heavy...	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

Shavings—			
Hard White Envelope Cuttings....$3.00		@	—
No. 1 Hard White Shavings	2.50	"	—
No. 1 Soft White.	2.15	"	—
White Blank News	1.65	"	—
No. 1 Mixed Shavings	—	"	—
Solid Ledger Stock..	—	"	—
No. 1 White Ledger.	2.12½	"	—
No. 1 Mixed or Colored Ledger.....	1.92½	"	—
No. 1 Books, heavy.	1.57½	"	—
Overissue Magazine..	1.67½	"	—
New Manila Envelope Cuttings	2.70	"	—
Container Manila....	—	"	—
New Kraft Cuttings.	2.60	"	—
Kraft Paper (Old)...	1.50	"	—
No. 1 Mixed Paper..	.65	"	—
Super-mixed Paper..	.70	"	—
Box Board Cuttings.	.72½	"	—
Corrugated Containers (old)	.80	"	—
New Corrugated Cuttings	.90	"	—
Overissue News....	.82½	"	—
No. 1 Baled News.	.75	"	—

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	3.75	@	4.00
No. 1 Soft White.	2.75	"	3.00
No. 2 Mixed.	.90	"	1.00
Solid Ledger Books.	2.25	"	2.50
Overissue Ledger Stock	1.75	"	2.00
White Ledger Stocks	1.50	"	1.65
Mixed Ledgers	1.25	"	—
No. 1 Heavy Books..	1.20	"	1.30
No. 1 Books, Light..	.75	"	.85
Crumpled Stitchless Book Stock	1.25	"	1.35
Manila Env. Cuttings	3.00	"	3.25
Manila Envelope Cuttings, extra quality	3.00	"	3.25
White Blank News..	1.70	"	1.80
No. 1 Kraft.....	2.25	"	2.40
Extra No. 1 Kraft...	2.65	"	3.00
Mixed Papers.....	.65	"	—
Print Manila	.75	"	—
Container Manila....	.65	"	.75
Old Newspapers.....	.70	"	.725
Paper Wool Strings.	1.30	"	1.35
Overissue News.....	.65	"	.70
Box Board Chips....	.35	"	—
Corrugated boxes....	.90	"	1.00
Kraft corrugated boxes	1.60	"	1.75
New Kraft Corrugated Cuttings....	2.00	"	2.25
Screening Wrappers.	.85	"	.90

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	5.00	@	—
Sisal Rope.....	3.50	"	4.00
Mixed Rope.....	1.00	"	1.25
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Soft Jute Rope.....	5.00	"	5.50
Manila Rope—			
Foreign .....(nominal)			
Domestic	6.00	"	6.25
Jute Carpet Threads.	3.00	"	3.25
Bleachery Burlap....	7.50	"	8.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	4.25	"	—
Scrap Sisal.....	3.25	"	3.50
Scrap Sisal for Shredding	3.25	"	3.50
Wool Tares—			
Foreign	(nominal)		
Domestic	5.00	"	5.50
Aust. Wool Pouches.	4.75	"	5.00
New Burlap Cuttings	5.50	"	5.75
Heavy baling bagging	4.25	"	4.50
Paper Mill Bagging..	4.00	"	4.25
No. 2 Bagging.....	.50	"	.60

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.03¾	"	.04
New White No. 1.	.07¾	"	.08
New Light Flannelettes	.06	"	.06¼
Canton Flannel, Bleached	.07½	"	.08
Underwear Cutters, Bleached	.07¾	"	.08
Silesias No. 1.....	.04¼	"	.04½
New Black Silesias..	.04½	"	.04½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached.....	.07½	"	.08
Blue Cheviots.....	.04½	"	.04¾
Fancy	.01¾	"	.02
Washable	.01¾	"	—
Cottons—According to Grades—			
Blue Overalls.....	.04¼	"	.04¼
New Black, Soft..	.03	"	.03¼
Khaki Cuttings.....	.02¼	"	.02½
O. D. Khaki.....	.02½	"	.03¼
Corduroy	.02	"	.02¼
New Canvas.....	.05½	"	—
B. V. D. Cuttings...	.06¼	"	.07

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	4.00	@	—
Miscellaneous	3.00	"	—
White No. 2—			
Miscellaneous	2.50	"	3.00
Twos and Blues.....	1.75	"	2..
Old Blue Overalls...	2.25	"	2.50
Thirds and Blues....	1.75	"	—
Miscellaneous	1.25	"	1..
Black Stockings.....	3.50	"	4.0
Roofing Stock—			
No. 1.....	1.80	"	—
No. 2.....	1.60	"	—
No. 3.....	1.50	"	—

Foreign Rags

(F. o. b. Boston)

Canvas .....(nominal)	
Dark Cottons.....(nominal)	
Dutch Blues.....(nominal)	
New Checks and Blues(nominal)	
Old Fustians.....(nominal)	
Old Linsey Garments. (nominal)	
New Silesias.....(nominal)	

Export Control of Waste Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 8, 1941—The Economic Defense Board, Office of Export Control, has issued Export Control Schedule No. 21, placing under license waste paper in its forms, conversions, and derivatives. Department of Commerce code numbers required to be placed upon export declarations and export license applications are listed below with the types of waste paper covered by the schedule:

Unit	Waste paper:	Department of Commerce No.
Lbs.	No. 1 mixed paper	4699.01
Lbs.	Super-mixed paper	4699.02
Lbs.	Old corrugated containers (except Kraft)	4699.03
Lbs.	Old Kraft corrugated containers	4699.05
Lbs.	New corrugated cuttings	4699.07
Lbs.	Box board cuttings	4699.09
Lbs.	White blank news	4699.11
Lbs.	Extra manilas	4699.13
Lbs.	New manila envelope cuttings	4699.15
Lbs.	No. 1 hard white shavings	4699.17
Lbs.	Hard white envelope cuttings	4699.19
Lbs.	No. 1 soft white shavings	4699.21
Lbs.	Fly leaf shavings	4699.23
Lbs.	No. 1 heavy books and magazines	4699.25
Lbs.	Mixed books	4699.27
Lbs.	Overissue magazines	4699.29
Lbs.	No. 1 mixed or colored ledger	4699.31
Lbs.	No. 1 white ledger	4699.33
Lbs.	No. 1 assorted Kraft (old Kraft)	4699.35
Lbs.	New 100% Kraft cuttings	4699.37
Lbs.	No. 100% Kraft corrugated cuttings	4699.39
Lbs.	Other waste paper	4699.58
Lbs.	Other paper stock (Report overissue and old newspapers in 4722)	4699.98
	Overissue and old newspapers:	
Lbs.	No. 1 baled news	4722.03
Lbs.	Overissue news	4722.05
Lbs.	Other	4722.98

Fire Damage at Knowlton Bros. Slight

WATERTOWN, N. Y., October 6, 1941—Fire breaking out last week in the machine room of Knowlton Brothers Company caused damage estimated at $1,000. The blaze is believed to have originated from a defective wire in the machine motor. Firemen were at the scene for several hours and prevented the fire from causing any serious damage. An official of the concern said that two motors, a fan and part of the cupola were considerably charred by the fire. Operations in the machine shop were temporarily suspended by the fire. It was claimed by the firemen that the blaze started from a defect in a machine of the blower room.